THE IMPACT OF CEO OPTION GRANTS ON FIRM VALUE:

DETERMINANTS OF THE EFFECTIVENESS OF OPTION GRANTS

A Dissertation

by

CATHERINE KRUEGER WEBER

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

December 2006

Major Subject: Accounting

THE IMPACT OF CEO OPTION GRANTS ON FIRM VALUE:

DETERMINANTS OF THE EFFECTIVENESS OF OPTION GRANTS

A Dissertation

by

CATHERINE KRUEGER WEBER

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Approved by:

Co-Chairs of Committee,	Robert H. Strawser
	K. Sivaramakrishnan
Committee Members,	Annie L. McGowan
	Dean W. Wichern
Head of Department,	James J. Benjamin

December 2006

Major Subject: Accounting

ABSTRACT

The Impact of CEO Option Grants on Firm Value: Determinants of the Effectiveness of Option Grants. (December 2006)

Catherine Krueger Weber, B.A., University of Richmond;

M.B.A., Duke University

Chair of Advisory Committee: Dr. Robert H. Strawser
Dr. K. Sivaramakrishnan

The significance of stock options as a component of executive compensation has fluctuated dramatically over the past decade. The purpose of this study is to investigate determinants of the effectiveness of stock option grants. These option grants are considered to be effective if they accomplish their intended role of enhancing firm value by inducing risk-taking behavior.

Using data from 2,349 firms that granted stock options to their Chief Executive Officer (CEO) between 1992 and 2001, the relationship between the options granted and subsequent firm value was examined. This study found no universal positive association between option grants and firm value. However, CEO incentive equilibrium, defined as stability in the CEO's stock and option portfolio sensitivity to stock price, was found to influence the association between stock option grants and firm value. The positive association between grants and firm value was evidenced for the sub-sample of firms that demonstrate disequilibrium in CEO incentives. This was not the case, however, for the CEO incentive equilibrium sub-sample. This finding indicates that the

positive valuation impact of stock option grants is highest for those firms that demonstrate a trend of increasing CEO portfolio sensitivity to stock price.

High CEO portfolio sensitivity to equity risk was not found to interact with grant sensitivity to equity risk in a manner that reduces firm value. Thus, this study did not find support for the hypothesis that, ceteris paribus, grants further reduce CEO diversification, and interact with portfolio sensitivity to reduce incentives for risk-taking. Consistent with Lambert, Larcker and Verrecchia (1991), however, a high level of uncorrelated wealth is found to interact with grant sensitivity to equity risk so as to increase the positive impact of grant sensitivity on firm value.

DEDICATION

This dissertation is dedicated to my parents, Ola and John Krueger, who believed in me practically all of the time, and who consistently modeled optimism, energy, compassion, and a passion for learning.

ACKNOWLEDGMENTS

Many thanks are due to my committee, whose direction and encouragement were essential to the completion of this project. To Bob Strawser, Shiva Sivaramakrishnan, Annie McGowan, and Dean Wichern, I extend my most sincere appreciation and admiration. Thank you.

The support of faculty and student colleagues was an integral part of the dissertation process. I deeply appreciate the very constructive feedback of faculty mentors and workshop participants that helped to shape this project.

Over the course of my PhD program my fellow doctoral students at Texas A&M University have had a profound influence on my intellectual achievements and aspirations. Thanks to all of you for your companionship and inspiration.

Finally, I extend many thanks to my family. Your support made this possible.

TABLE OF CONTENTS

CHAPTER Page

LIST OF TABLES

CHAPTER I

INTRODUCTION

The significance of stock options as a compensation instrument has fluctuated dramatically over the past decade. Between 1992 and 2000, stock option grants to S&P 500 CEOs increased from $11 billion to $119 billion. However by 2002, this total had fallen to $71 billion (Hall and Murphy 2003). Contemporaneous with this fluctuation in the amount of stock option grants awarded, research findings on the value of stock options are somewhat mixed. The decline in the importance of stock options as a compensation instrument has been accompanied by a body of research finding that stock options may be an inefficient way to compensate executives. However, the instance of stock option awards continues to exceed pre-1992 levels, and analytical research using agency models continues to demonstrate the value to shareholders of an option-based compensation contract.

A primary objective of the inclusion of stock options in executive compensation is to increase firm value by inducing corporate stewards to pursue risky investments.[1] The purpose of this paper is to investigate determinants of the effectiveness of stock option grants. Stock option grants are said to be effective if they accomplish their intended role of enhancing firm value by inducing risk-taking behavior.

This dissertation follows the style of *The Accounting Review*.

[1] Owners of the firm are assumed to be risk-neutral; i.e. not risk-seekers. They are not interested in increased risk for its own sake, but are interested in the best possible investment selection. Additional risk that may be involved in pursuit of the project with the highest net present value is irrelevant.

Examining the effectiveness of stock options in generating risk-taking incentives is important in light of the significant percentage of compensation that options continue to represent, as well as their high visibility as a form of compensation. Between 1992 and 1996, for manufacturing firms, stock options as a percent of total executive compensation increased from 27% to 36%. This increase represented a doubling of stock option pay, in dollar terms (Murphy 1999). As a result of the substantial and highly publicized increases in stock option compensation, their impact on corporate performance came under increased scrutiny. Corporate scandals of the late 1990s (e.g. Enron and WorldCom) were linked to excessive stock option compensation. This attribution imposed substantial political costs on firms that granted options to CEOs, and fueled a decline in the instances of stock option grants. Certain firms, of which Microsoft is a notable example, have been highly publicized and praised for discontinuing stock option grants in favor of restricted stock grants. Yet, the question remains unresolved as to the role of stock options in adding value to a firm.

The effectiveness of a stock option grant will depend on how the recipient values it. Lambert, Larcker, and Verrechia (1991 hereafter LLV) indicate that CEOs value stock option compensation differently than do shareholders. A CEO's valuation of a stock option is largely a function of his or her overall compensation structure. In fact, LLV suggest that depending on the incentive effects generated by other components of the CEO's compensation package, stock option grants may not always be effective in inducing risk-taking behavior. Motivated by these arguments, this paper presents an

empirical investigation into the effectiveness of stock option grants after controlling for the incentive effects of other components of a compensation portfolio.

Guay (1999) examines how stock option grants influence the sensitivity of executive compensation to equity risk. He presents a cross-sectional study demonstrating that stock options significantly increase the sensitivity of the CEO's compensation to equity risk, and that this sensitivity is positively related to firms' investment opportunities and the standard deviation of stock returns. Taken together, these observations are consistent with the notion that, *on average*, stock options are associated with increased value-maximizing risk-taking behavior. However, as emphasized earlier, the effectiveness of individual stock option grants can only be determined in conjunction with other components of CEO compensation.

It is reasonable to expect that an efficient compensation committee will be cognizant of the incentive impact of the various components of a CEO's compensation package when granting new stock options. This study assumes that a compensation committee awards options in such a manner as to generate a desired level of incentive, with incentives measured in terms of sensitivity to equity risk. This assumption about the compensation committee is central to this study. If this assumption does not hold, if compensation committees grant options without accurate consideration of the resultant portfolio incentives held by the CEO, then this study is biased against finding a relationship between grants and returns. Further discussion of the implications for this study if the maintained assumption does not hold is provided in the Conclusions, Chapter VIII.

All else being equal, a committee would grant options to achieve one of two objectives. The grant could be designed to offset a decrease in risk-taking incentives arising from changes in the CEO's portfolio (e.g., when a CEO exercises previously granted stock options). Alternatively, the grant could be intended to increase the overall incentive for risk-taking. This argument, that options are granted to achieve one of the two aforementioned objectives, is based on two crucial assumptions. First, it assumes that compensation committees are efficient and able to correctly assess the incentive effects of the various components of a compensation package. Second, it assumes that options are granted only for their incentive effects. Under these two assumptions, option grants are unlikely to be associated with a decrease in risk-taking behavior.

The empirical evidence of Core and Guay (1999) that options are granted so as to maintain an optimal level of exposure to stock price in CEO compensation, suggests that on average, compensation committees are efficient in approaching optimal levels of CEO incentives. In their study, optimal equity incentives in a CEOs portfolio are modeled as a function of market value, idiosyncratic risk, investment opportunities, free cash flow risk, and CEO tenure. Option grants are then modeled as a function of the residual from the above incentive model as well as firm specific variables that are hypothesized to influence option grants. They find a significant negative association between option grants and the residual from the incentive model, indicating that grants are awarded in order to move the stock option incentives toward an optimal level. However, given LLV's argument that the overall portfolio of compensation investments should be considered simultaneously with the grant decision to determine the

incentive effects of stock option grants, a stronger test of the argument for compensation committee efficiency is to examine the effectiveness of stock option grants on a firm-by-firm basis, including interaction between option grants and other components of CEO compensation. This study contributes this important extension to the body of research on CEO compensation incentives.

There are other reasons a firm may offer stock options; for example, 1) to recruit or retain high-demand CEOs in a competitive market where stock options are a standard practice; 2) to replace cash compensation for firms with binding liquidity constraints; 3) to minimize tax consequences of compensation; or 4) to avoid the political cost that may be associated with more visible forms of executive pay. In their analysis, Core and Guay acknowledge and control for alternative objectives of stock options. Regardless of the reason for granting an option, however, the attendant incentive impact of the grant cannot be ignored.

This study assesses the incentive impact of stock options through the relationship between option grants and stock price. The disclosure of stock option grant data influences investor expectations regarding managerial actions in response to the stock option incentives. It takes a significant amount of time for investment incentives to come to fruition. Project selection, investment, and development are required before returns from the investment are realized. Even then, the project may or may not generate the expected returns. Measuring the impact of option grants based on the outcome of investment projects undertaken is impractical. The length of time between option

grant and investment fruition, and the possibility of failed investment projects will significantly limit the power of tests of the hypothesis.

Semi-strong form efficient capital markets assess the impact of CEO compensation upon disclosure of the information. Many recent studies question the validity of the Efficient Market Hypothesis, hereafter EMH.[2] To the extent that the market is somewhat efficient, however, and there is some relationship between option grant disclosure and stock price, this study should note a significant relationship between the disclosure of grant sensitivity information and returns measured subsequent to the disclosure. The assumption underpinning this study is that a weak form EMH is maintained.

Core and Guay's analysis does not address the impact of stock options on firm value. A reasonable expectation is that achievement of an optimal compensation contract is associated with increased firm value. Yermack (1997) and Aboody and Kaznik (2000) find a positive stock price reaction following stock option grants. Since stock option grants are not immediately disclosed, short-horizon returns are somewhat difficult to interpret. However, Yermack finds consistently positive cumulative abnormal stock returns (CARs) beginning at 10 days following a grant up through 120 days following the grant, even though disclosure lags behind the grant by approximately three months, and in some instances, by as much as 15 months.

Hanlon, et al (2003) estimate that $3.71 in future Operating Income is associated with one dollar of Black-Scholes option value granted. Aboody (1996), however,

[2] Shiller (2003) traces the evolution of economic thought from EMH to behavioral finance. Kothari (2001) addresses the implications of a maintained assumption of market efficiency for accounting research, and discusses recent research testing the EMH in the context of accounting information.

finds that a dollar of stock option value reduces firm value by $1.35, when stock options are valued using a modified binomial model, suggesting that the dilution effects outweigh the incentive impact of stock options.

A reason for mixed results regarding the relationship between stock option grants and firm value is the nature of the association between CEO compensation, a firm's investment opportunity set (IOS), and firm value. It seems reasonable to assume that these three components are endogenously determined in equilibrium. All else equal, stability in the level of CEO incentives is an indicator that the firm may be in an equilibrium state.

These observations call attention to a direction to follow in examining the impact of stock option grants—delineate firms that are "stable" in terms of CEO incentives from those that are in disequilibrium, or "trending".[3] "Stable" firms are those that demonstrate a stable sensitivity to stock price in the CEOs portfolio before and after stock option grants,[4] and "trending" firms are those exhibiting consistently increasing sensitivities in these portfolios[5]. A third category of firms, designated "temporal trend," includes those where the CEO's portfolio sensitivity may fluctuate dramatically

[3] In this dissertation, the terms "stable sensitivity" and "equilibrium" are used synonymously. Similarly, "trending" and "disequilibrium" are terms used interchangeably.

[4] Stable sensitivity in the CEOs portfolio of incentives is defined as one that does not increase or decrease by more than 10% over the three year horizon from the beginning of the year of the grant to the end of the year following disclosure of the grant sensitivity information. The mean sensitivity at the end of year 3 is within 10% of the mean sensitivity at the beginning of the year of the grant. Chapter V, Methodology, contains a schematic of the timelines over which this equilibrium is measured,

[5] The Core and Guay (1999) optimal contract analysis is based on portfolio sensitivity to stock price. The focus in this study is the risk incentives in stock option grants, which suggests that an equilibrium analysis based on portfolio sensitivity to equity risk might be more appropriate here. The results of the empirical analysis in this study are essentially the same, regardless of the sensitivity metric employed, however. Therefore, consistent with prior research, the results presented are based on equilibrium portfolio sensitivity to stock price.

during the period of investigation, but over the horizon in its entirety remains unchanged, as well as firm years where incentives decline.

The hypothesis that option grants will have a significant impact on firm value for "trending," or disequilibrium, firms is tested. It is predicted that the sensitivity of these option grants will be positively associated with firm value for "trending" firms. The strength and direction of this association depend on the incentive effects of other components of the CEO's existing compensation portfolio, however. Therefore, as LLV suggest, this study tests the hypotheses that (i) option grant incentives are likely to result in greater risk-taking, and thus increase firm value, when the fixed compensation in the existing portfolio is higher; and (ii) the impact of option grant incentives is likely to be muted by a higher level of stock-based compensation in the existing compensation portfolio.

A direct assessment of the effectiveness of stock options in inducing risk-related increases in firm value requires a measure of "risk-taking." Under the EMH, current price is market value, and therefore a proxy for firm value. This study examines whether the increase in market value, the return on the stock subsequent to option grants, reflects stock market expectations for increased value due to risk-taking by CEOs.[6] Of particular interest in measuring investment risk-taking is the ability of the measure to capture the level of future growth opportunities available to the firm. Ex-

[6] This approach is in the spirit of Tufano (1996) and Rajgopal and Shevlin (2002) who used the level of risk management, namely hedging and insurance programs, that were implemented in the gold mining industry and the riskiness of development projects in the oil and gas industry, respectively, as proxies for managerial risk-taking. Both studies found an association between managerial risk-taking and the stock option component of a CEO's portfolio. However, neither study examines how the other compensation components affect this association, nor does either address the valuation implications of this association.

panding the set of available growth opportunities, either by increasing the number of investment opportunities, or increasing the scope of a smaller number of projects, represents investment risk taken in order to advance potential growth in firm value.

It is important to recognize that corporate stewards, by way of their experience and expertise, are in a position to both *identify and influence* the firm's growth opportunities. The firm value contributed by real investment options represents an investment decision variable for the CEO (Baker 1993). This study examines the role of option grants as determinants of firm characteristics, where the characteristic of the firm (in this case, returns) are determined by stock option compensation. Other studies have investigated a similar directional hypothesis.[7] This is a different directional hypothesis from empirical studies (Gaver and Gaver 1993a, 1993b; Guay 1999; Janakiraman 1998; Smith and Watts 1992; Yermack 1995), which have investigated the determinants of option compensation. In general, these studies found that compensation boards of firms with higher growth opportunities are more likely to grant stock options.[8] Both of these directional influences can coexist; however, the focus of the current study is examination of the impact of CEO stock option grants on a *subsequent* measure of firm value.

This study contributes to the compensation and incentives literature by providing evidence on the impact of option grant sensitivity on firm value. Prior work has

[7] For example, Hanlon et al. (2003), examines the impact of stock option grants on the subsequent Operating Income of a firm.

[8] Guay (1999) observes that "Since risk-related investment problems are expected to be greatest for firms with substantial investment opportunities, the magnitude of convexity in executives' wealth-performance relation is expected to be positively related to the proportion of assets that are growth options". One exception to the general finding is that of Yermack (1995). The Yermack study does not find a significant positive relationship between a firm's investment opportunity set and option grants.

investigated the relationship between *portfolio* sensitivity to equity risk and firm characteristics. However, compensation committees manage incentives through grants, and this study contributes evidence regarding the impact of these grants. In addition this study empirically investigates the relationship between firm value and the interaction of option grants and incentive equilibrium in the CEO's portfolio, to identify whether the incentive equilibrium status of the portfolio moderates the relationship between stock option grants and firm value. A third contribution of this study is the development of empirical evidence in support of the analytical findings of LLV, that portfolio considerations of correlated and non-correlated wealth have an impact on the incentive value of an option grant.

This study does not find that CEO option grants are universally associated with increased stock price subsequent to the option grants However, in the presence of incentive disequilibrium, where CEO portfolio incentives are increasing over time, a positive association between option grants and subsequent returns is documented.

The sensitivity of option grants is found to be associated with firm value across all firms in the sample. This result is driven, however, by the firms that are in incentive disequilibrium. For firms with stable levels of CEO incentives, this relationship is not noted. A significant interaction between the sensitivity of option grants and that of the CEO's portfolio is not found. However, consistent with LLV (1991), the sensitivity of an option grant is found to have a greater impact on firm value when the CEO has greater unrelated wealth.

Further tests, tabulated in this paper, find that the relationship between portfolio and grant incentives is dependent on the equilibrium status of the CEOs portfolio. For CEOs with portfolio sensitivities that consistently trend upward, a significant interaction between grant and portfolio sensitivities is noted. In all this study highlights the importance of CEO portfolio characteristics in assessing the incentive value of an option grant. The remainder of this paper is organized as follows. Chapter II provides a survey of related literature. In Chapter III, the hypotheses of this research are developed. In Chapters IV and V the data and research sample are described, and the methodology is explained, respectively. Chapter VI presents the results, and Chapter VII discusses sensitivity analyses performed on these results. Chapter VIII presents the conclusion, and identifies areas and issues for future research.

CHAPTER II

LITERATURE REVIEW

The increased level of stock option compensation that has been awarded to CEOs of U.S. corporations in the 1990s has been accompanied by a proliferation of research on stock options by accounting, finance and management academics. A desire to understand the objectives, characteristics and impact of stock options has generated this increase in research attention. The following review of significant papers addressing stock options will focus on papers addressing, in turn, the rationale for stock options, evidence about the impact of options on achieving their goal, and evidence regarding the impact of executive stock options on shareholder value. The final section of this review will track the evolution of the measurement of stock option compensation.

The Rationale for Stock Option Compensation

The rationale for stock option compensation is found in the agency model of the firm.[9] In the basic agency model, the owner of a firm hires an agent to whom he delegates decisions about resource allocation. An effort-averse agent will require compensation from the owner of a firm to provide this managerial service. While there are multiple layers of principal-agent contracts within a firm, this research focuses on the contract between a firm's board of directors (the principal) and the CEO.

[9] Baiman (1982; 1990) provides surveys of early literature in agency theory that has applications to accounting.

The inherent divergence of interests between the owner and the agent he hires generates tension in this relationship. The owner of the firm is risk neutral, and prefers a high level of effort by the agent. The agent is both risk- and effort-averse. The difference in preference for effort is addressed by compensation to the agent commensurate in value to the cost of effort expended. This would be simple enough if the principal were able to observe the effort expended. Since such is rarely the case, compensation is frequently based on observable output. This asymmetry in information regarding agent effort gives rise to the problem generated by differences in risk preference.

Standard models of the agency problem assume that an agent's effort increases output in terms of first-order stochastic dominance. An increase in the level of an agent's effort is assumed to result in a shift to the right in the resulting distribution of output. The stochastic nature of the relationship between agent effort and outcome increases the cost of agent effort. The expected benefit to an agent of a given level of effort is reduced by both the cost of the effort, and a risk premium, which adjusts the expected benefit downward for the risk that effort may be expended with little or no improvement in outcome.

Holmstrom (1979) developed a seminal model of the principal-agent problem. In the absence of risk-aversion on the part of the agent, the first-best solution to the agency problem is for the principal to sell the firm to the agent for its expected value. The risk-averse agent, however, will only pay the expected value less a risk premium. Thus, they will be unable to negotiate a price for the transaction.

The principal can shield a risk-averse agent from the risk of the firm by bearing all risk himself. This is achieved through a constant-wage contract. An example of this would be the CEO who receives strictly cash compensation.[10] Even here, however, the principal cannot shield the agent from human capital risk (Holmstrom et al. 1986). This first-best solution assumes that the principal can observe the effort supplied by the agent, and that a forcing contract can be implemented that pays a flat wage based on the agent's acceptable level of effort. When the agent effort is unobservable, as is the case with CEOs, the first-best solution is no longer optimal. A flat wage in the presence of unobservable effort leads to agent shirking.

Holmstrom (1979) demonstrated the superiority of the second-best solution in this case. When agent effort is unobservable, the optimal contract imposes some level of risk on the agent to encourage a higher level of effort. The optimal level of risk-sharing increases as the marginal return to the firm of agent effort increases. When agent effort makes a difference, as is assumed to be the case for CEOs, some level of risk-sharing is optimal.

Lambert (1986) pointed out a significant limitation of the standard agency model particularly relevant to the model as applied to CEO compensation contracts. A key assumption in the basic model is that agent effort shifts the distribution of out-comes to the right in terms of first-order stochastic dominance. The conventional model does not take into account that the effort desired by the principal from an agent could involve project selection as well as project execution. Such expectations are

[10] This is a relatively rare case.

clearly the case for CEOs. The importance of project selection in the principal-agent model is the potential for project selection to introduce changes in the variance of outcomes. Projects with different amounts of risk, as measured by the variance in potential outcomes, cannot be ranked in terms of stochastic dominance. CEOs are assumed to be risk-averse, and to select projects based on personal financial interests. Therefore, it is likely that a CEO would select a project with a lower expected value and lower risk while the risk-neutral principal would prefer a competing project with higher expected value but higher risk. To the risk-neutral principal, the increased risk is irrelevant to the decision process. Lambert (1986) shows that under standard utility function assumptions, this project selection rule will result in underinvestment, defined as failure of the CEO to pursue positive net present value (NPV) projects. This finding highlights the importance of a compensation contract that aligns the risk preferences of the CEO and the owners of the firm to mitigate underinvestment.

The Impact of Stock Option Compensation on Risk-Taking

Research has established a positive relationship between firm size and compensation (Murphy 1999; Rosen 1992; Yermack 1995). A larger firm is assumed to be more complex and have greater demands on the capabilities of the CEO. A larger firm will require a more talented CEO, and hence, must pay more, consistent with microeconomic theory, which requires that the marginal cost of an input equal its marginal product in equilibrium.

Smith and Watts (1992) is among the first papers to address the determinants of firm compensation policy including incentive compensation. They found that, control-

ling for accounting return, CEO salary and stock option compensation is positively associated with the firm's investment opportunity set, while bonus compensation is inversely related. Theirs is an industry-level study, which excludes regulated industries. Compensation is measured as the median CEO salary in the industry. Incentive compensation is measured as 1) the percent of firms in the industry offering bonus plans and 2) the percent of firms in the industry that offer stock-option plans. Smith and Watts assumed that all firms had access to the same stakeholders and contracting technology. Three factors create cross-sectional differences in firm compensation, namely, taxes (tax rationale), regulation (regulatory rationale), and the specific set of investments that each firm develops (contracting rationale). Smith and Watts tested and found support for only the contracting rationale, or the size of the investment opportunity set, as an explanatory variable for CEO compensation. A larger set of investment opportunities will require greater effort on the part of the CEO to 1) evaluate options to prioritize exercise and 2) to exercise real options. Since information about the value of real options is unavailable to owners of the firm, agency conflict is positively associated with the size of the set of real options.

Gaver and Gaver (1993a) conducted a firm-level study following Smith and Watts (1992). This study produced additional support for the finding that CEO cash compensation and the incidence of stock option plans are positively associated with the size of a firm's investment opportunity set, after controlling for size. Gaver and Gaver measure the investment opportunity set using a factor score based on six parameters that are standard proxies for firm value, risk and growth.

Following Gaver and Gaver (1993a), Baber, Janakiraman and Kang (1996, hereafter BJK) studied the relationship between changes in compensation and the firm's investment opportunity set. They found that, while not directly associated with total change in CEO pay, a firm's investment opportunity set is a moderating variable in the relationship between CEO pay and firm performance. A greater investment opportunity set increases the sensitivity of compensation to stock performance. BJK used a factor score to operationalize the firm investment opportunity set; however, they employed somewhat different measures to create the factor score.

Baker (1993) questioned the results of the Gaver and Gaver study based on the relationship it found between firm size and investment opportunity set. Baker found the Gaver and Gaver (1993a) result that high-growth firms are the larger firms in terms of asset size counterintuitive. Notwithstanding Baker's questions, Gaver and Gaver and BJK both found support for a relationship between firm size and CEO compensation when firm size is measured in such a way that it is correlated with the size of the firm's investment opportunity set. Baker (1993) pointed out that, contrary to being an exogenous factor, the investment opportunity set is a choice variable for the firm. This choice is the critical notion that links the analytical research of Lambert (1986) with the empirical research demonstrating the relationship between incentive compensation and the size of a firm's investment opportunity set.[11] There is endogeneity in the system of CEO pay, firm investment selection, and the size of the firm's investment opportunity

[11] Other studies that find a positive association between the investment opportunity set and firms' use of stock options are Lewellen et al. (1987), Matsunaga (1995), and Mehran (1995). However, Bizjak et al. (1993) and Yermack (1995) find a negative association between stock options and the investment opportunity set.

set. Empirical research provides evidence that pay is contingent on the size of the investment opportunity set. Analytical research indicates that project selection, and, therefore, the size of a firm's investment opportunity set, may be influenced by characteristics of the CEOs compensation scheme. In particular, the importance of risk-sharing highlights the significance of equity-based pay in a CEOs compensation portfolio.

Alignment of risk preferences is the theoretical argument for paying CEOs incentive compensation. Incentive pay can take one of two basic forms, namely restricted stock awards or stock option grants. This statement vastly oversimplifies the broad array of compensation options available to compensation committees;[12] however, it enables enumeration of the important distinctions between two major forms of incentive pay. The unique characteristics of stock options as opposed to restricted stock awards highlight some of the interesting differences in the incentives provided by the two forms of compensation.

Smith and Stultz (1985) examined the differences in stock versus option incentives in the context of a manager's hedging choices. Hedging is defined as the reduction in variance of investment outcomes through the acquisition of financial assets. Smith and Stultz found that if the CEO's end-of-period wealth is a concave function of end-of-period firm value, then the CEO will hedge the firm completely. If the end-of-period wealth is a convex function , but utility, i.e., preferences for lotteries, is a concave function of firm value, then the CEO will conduct partial hedging. (Risk-aversion im-

[12] See, for instance, Kole (1997).

plies a concave utility function.) However, if the CEO utility function is a convex function of firm value, as may be induced with compensation instruments that promote risk-seeking such as bonuses or stock options, the CEO will behave as a risk-seeker and will find zero hedging to be optimal. Thus, the more option-like features of a compensation portfolio, the less hedging will be optimal for the CEO. The essential contribution of stock options to a compensation portfolio is the convexity in the relationship between the CEO's utility and the value of the firm.

Guay (1999) furthered the notion of convexity in a CEOs compensation contract, by calculating the convexity of a compensation portfolio and finding it positively associated with the size of a firm's investment opportunity set. Guay measures convexity as the partial derivative of an option's Black-Scholes value with respect to stock-return volatility. While the convexity measure he calculated for stock option portfolios is significantly different from zero, he finds that the convexity for a restricted stock portfolio is not significantly different from zero. A share of stock is deemed to be a call option of the value of the firm, and thus Guay uses an implicit valuation in his analysis of the convexity of restricted stock.

The difference in incentives between a share of restricted stock and a call option is further examined by Feltham and Wu (2001). They modeled the cost to shareholders of generating a given level of effort through stock shares versus the cost of generating the same effort with on-the-money stock options and found that when the agent's ability to influence the risk of the terminal value of the firm is low, stock shares are more efficient. When the agent has a high ability to influence variance in the termi-

nal value of the firm, however, such as is the case with CEOs, options become more effective (i.e., options cost less to generate a given level of effort). Along the same lines, Lambert and Larcker (2004) found that for most parameters of CEO risk-aversion, the optimal contract is either partly or totally option-based; a compensation scheme based strictly on restricted stock is generally sub-optimal.

With respect to increasing the risk preferences of the agent, debate continues as to the effectiveness of stock options. Empirical evidence exists to support the hypothesis that stock option compensation increases an agent's managerial risk-taking behavior (DeFusco et al. 1990; Garvey and Mawani 2005; Guay 1999; Rajgopal and Shevlin 2002; Tufano 1996). However, arguments against this conclusion are also persuasive. Carpenter (2002) finds conditions under which giving a manager more options induces a reduction in asset volatility as a result of the leverage inherent in the manager's stock options. Analysis by Ross (2004) finds that for generally assumed preferences, call options do not make agents less risk-averse. The convexity that makes a risky bet more desirable can be more than offset by the other effects of the options that 1) move the evaluation of the bet to a new, possibly more risk-averse, section of the utility function, and 2) magnify the delta in the CEOs total compensation package created by additional options. These findings once again highlight the importance of a CEO's wealth and position vis-à-vis the risk-aversion portions of the utility function in attempting to assess the impact of stock options on a CEOs preferences for risk. Furthermore, Ross emphasizes the magnification of the bet that is imposed by the incremental addition of stock options.

Other Reasons for Stock Option Grants

Empirical analysis of the effectiveness of stock options would be simplified if the rationale for stock options were restricted to incentives for effort or risk-taking in project selection. There are a number of other reasons compensation committees grant stock options, however. Many of these reasons have been tested and found to have descriptive validity as explanatory factors in stock option compensation.

The problem of the investment horizon is related to underinvestment. CEOs may be expected to have a shorter investment horizon than owners of the firm. Dechow and Sloan (1991) found that executives in their later years spend less on research and development, in an effort to improve short-term earnings. They found, however, that stock and option ownership mitigate this relationship. In related research, Llewellen et al. (1987) found that the age of an executive is positively associated with the incidence of stock-related compensation; however subsequent research has failed to demonstrate a significant relationship between stock option awards and CEO age (Yermack 1995). Use of CEO age is an alternate specification of the investment-horizon hypothesis.

Several studies have examined the relationship between the fraction of firm equity held by the CEO and the incidence of stock option grants. Theory would suggest an inverse relationship, with greater CEO ownership resulting in a lower requirement for additional equity grants. Mehran (1995) found the hypothesized negative association. Llewellen et al. (1987), Matsunaga (1995), and Yermack (1995) failed to find a significant relationship, however. Haubrich (1994) and Hall and Liebman (1998) demonstrated that even small ownership percentage can provide incentives, providing fur-

ther rationale for the absence of a significant relationship between CEO equity holdings as a percent of total equity and stock option grants. Core and Guay (1999) found that CEO holdings are, under certain conditions, inversely associated with equity awards. The variables in their study were constructed to measure incentives rather than proportional ownership, however.

Yermack (1995) investigated liquidity as a rationale for stock option grants, with liquidity operationalized using dividend payment data. Yermack found the hypothesized negative association between liquidity and stock option grants. Firms use options to compensate CEOs when cash constraints are binding. Lambert, et.al. (1987) pointed out that managers are in a position to influence the value of options through dividend policy. Their research found that dividends are lower following adoption of a stock option plan.

Lambert and Larcker (1987) found that the relative use of market-based performance measures is inversely related to noisiness in accounting data. Llewellen et al. (1987) provided additional empirical support for this finding. Yermack (1995), however, did not find a significant relationship between stock option grants and noise in accounting earnings as measured by variance in the change in return on equity (ROE) as a percent of variance in annual stock returns.

Tax reduction incentives and the impact of being in a regulated industry are additional rationales for stock option compensation. Yermak (1995) found no support for an association between stock option grants and net operating loss (NOL) status, but did find a negative association between regulated industry status and incidence of stock

options. The finding regarding industry regulation is driven by utilities and insurance companies and does not obtain for banks.

Earnings management incentives, or a high cost of reporting low earnings, could be a rationale for stock option grants. Matsunaga (1995) provided evidence of earnings management using stock options. Proportional interest costs serve as a proxy for the cost of reporting low earnings. This study shows a positive association between stock option awards and greater cost associated with reporting low accounting earnings (i.e., greater incentives for earnings management). Yermack (1995), however, found no such relationship.

The Impact of Stock Option Compensation on Firm Value

While the motivation for stock option compensation may be mixed, ultimately its objective is improvement in firm value, notwithstanding the rent extraction hypothesis.[13] The debate continues on this point as well.

Tehranian and Wagelin (1985) found that stock price increased 11 percent on the announcement of a firm's implementation of an executive compensation plan that linked pay to accounting returns. Demsetz and Lehn (1985) and Loderer and Martin (1997), did not find significant association between stock ownership and firm performance, however. Similarly, the evidence regarding the impact of stock options is mixed. Yermack (1997)and Aboody and Kaznik (2000) found that stock option grants were

[13] The rent extraction hypothesis posits that managers are able to set their own awards, and do so opportunistically, and potentially in conflict with shareholder value maximization. Studies that provide support for the rent extraction hypothesis include Yermack, (1997) and Aboody and Kasznik, (2000). Hanlon, et. al. (2004) however, do not find support for rent extraction in their study.

associated with increased firm value. Aboody (1996) found an inverse relation between stock option holdings by CEOs and firm value.

Studies that examine the value relevance of Statement of Financial Accounting Standards (SFAS) 123 disclosures include Rees and Stott (1998) and Aboody, et. al. (2004). Rees and Stott found that the SFAS 123 expense was valued in an opposite direction from other firm expenses, implying a positive investor expectation of future net benefits from stock option grants. Aboody, et. al. included in their model a factor to capture the future benefits of the grant. They found that the SFAS 123 expense is negatively associated with firm value, as would be any operating expense when the future benefits arising from the expense are captured separately in the model.

Core and Guay (2002) found evidence that stock options were granted in such a manner as to establish or maintain an optimal level of pay-to-performance incentives, as determined by established criteria for option grant awards based on extant theory of stock option compensation. The present study is concerned with idiosyncratic knowledge regarding the conditions under which stock option grants are associated with increased firm value. That Core and Guay have identified an essential equilibrium in this system does not obviate the need for idiosyncratic knowledge of the conditions for individual grant effectiveness.

Measurement of Stock Option Compensation

Methods for measuring stock option compensation have evolved substantially as the significance of this component of executive compensation has increased. Early research adopted indicator variables to separate firms with executive stock options

from those whose executives did not hold stock options(DeFusco et al. 1990; Gaver and Gaver 1993a; Smith and Watts 1992). Subsequent researchers refined this proxy for the value of stock options, using the number of stock options (Tufano 1996) and the number of options multiplied by the stock price (Baker and Hall 1998).

A major complication in examining the impact of stock options is operationalizing their value. LLV (1991) emphasized the difference in stock option valuation between stockholders and CEOs. Early research on stock options focused on the valuation of options from the perspective of stockholders. This was predominantly the result of the substantial controversy surrounding SFAS 123. Issued in 1995, SFAS 123 established a fair-value based valuation for stock options with the exception of those awarded to employees. For employee stock options, firms could continue the widely accepted practice of following Accounting Principles Board opinion #25 (APB-25) but were still required to provide a pro-forma disclosure of net income as if the fair value method were used.

The foundation work in measurement and valuation of stock options is the seminal work of Black and Scholes (1973). Noreen and Wolfson (1981) analyzed the applicability of the Black-Scholes option pricing model to the valuation of executive stock options. They noted the similarity between executive stock options and publicly traded warrants and provided evidence that the application of the Black-Scholes model to employee stock options is not inappropriate. Furthermore, they compared the Cox-Ross model to the Black-Scholes and found no difference between the two in the rela-

tive errors generated by application of the models to traded warrants with terms similar to executive stock options.

The Black-Scholes pricing model is widely used as an analytical tool for capital market participants to price and hedge options (Hull 2000). Furthermore, accounting researchers have applied the Black-Scholes model to the valuation of stock options for research purposes. Significant attention was paid to adjustments to the Black-Scholes model to accommodate the differences between stock options granted to executives and those that are publicly traded by capital market participants. The primary differences are term to maturity, liquidity, and the dilutive nature of employee stock options versus traded stock options (Huddart 1994). Much of this work was done at the time that the Financial Accounting Standards Board (FASB) was deliberating Statement 123, and was focused on improving financial statement presentation by modifying the Black-Scholes model to reflect the major differences between traded stock options and executive compensation stock options.[14]

Antle and Smith (1985) described an inventory-type methodology for measuring the value of stock options that uses a form of the Black-Scholes model. Application of the Black-Scholes option-pricing model was facilitated by the subsequent introduction of mandatory stock option data in the annual financial reports of publicly-traded companies. Researchers used the model to measure the value of current year option

[14] Significant papers include Foster, Koogler and Vickery (1991), Huddart (1994), Hemmer, Matsunaga and Shevlin (1994), and Carpenter (2002).

grants (Mehran 1995) and the value of the executive's option portfolio (Agrawal and Mandeleker 1987).

The value of an option to a CEO is different from the valuation by a shareholder, however (LLV, 1991). The Black-Scholes value of an option grant is determined at the date of the grant for financial statement purposes. A better measure of the continuing incentives in an option grant is the manner in which the intrinsic value of the option changes based on executive actions. The impact of agent actions on equity-based compensation is termed pay-performance sensitivity. Jensen and Murphy (1990) defined pay-performance sensitivity as the dollar change in CEO wealth per dollar change in shareholder wealth. The measure of a manager's incentives to select actions that affect the parameters of the distribution of an outcome, however, are best described by the derivative of the manager's expected utility with respect to changes in those parameters (Lambert et al. 1991). The incentive imbedded in an option grant for a CEO to increase stock price would then be expressed as the delta of the option grant, or the derivative of the option grant value with respect to stock price (Hall 1998), and the incentive to increase risk as the vega, or derivative of the option grant value with respect to the variance in stock returns (Guay 1999; Lambert et al. 1991). This study employs vega, the sensitivity of option value to stock return volatility, as the measure of CEO incentives. These incentives are computed following the one-year approximation method developed by Core and Guay (2002).

CHAPTER III

HYPOTHESIS DEVELOPMENT

The Role of Stock Options in CEO Compensation

CEO compensation can be broadly categorized as either sensitive or insensitive to firm performance (Kole 1997). The primary component of insensitive compensation is salary, although insurance benefits, vacation pay, and other perquisites are other examples of insensitive forms of compensation as well. In a compensation scheme, salary performs the role of insuring that CEO pay meets a reservation wage and insulating the CEO from some amount of compensation risk.[15] A compensation contract that consists wholly of salary is suboptimal in the absence of completely observable performance, however, since it fails to check inherent moral hazard. The normative prescription for moral hazard, founded in agency theory, is a pay scheme that imposes risk-sharing via performance-sensitive compensation.

Cash bonus compensation is sensitive to firm performance in that these payments are generally made on the basis of achievement of performance targets, both financial and non-financial. The significance of bonus payments in a compensation scheme will be contingent on the relative noisiness of accounting signals versus market (price) signals, as well as the relative informativeness of the accounting signal versus a market signal regarding CEO actions (Lambert and Larcker 1987). Emphasis on bonus

[15] Of course, threat of termination is a compensation risk that even salary cannot insure against. In this sense, all compensation is sensitive to firm performance.

payments in a compensation scheme is increased when accounting signals are a) less noisy and b) more sensitive to managerial action. While bonus-based compensation addresses moral hazard on the part of the CEO, it provides the CEO with earnings management incentives (Healy 1985).

Equity-based compensation is a widely accepted form of performance-sensitive compensation. It is weighted more heavily in a compensation contract when accounting signals are noisy (Lambert and Larcker 1987), and when a high level of investment opportunity requires incentives for managers to focus attention on developing these opportunities (Kole 1997; Myers 1977; Smith and Watts 1992). Equity-based pay achieves alignment of shareholder and CEO interests in terms of investment horizon (DeChow and Sloan 1991), and effects a risk-sharing between the CEO and shareholders that reduces moral hazard. Stock shares and stock options are not equivalent compensation instruments, however, because they expose the CEO to different risks..

In the standard agency problem, the principal (shareholder) is assumed to be risk neutral while the agent (CEO) is risk averse; the shareholder can diversify holdings while the CEO cannot. The CEO of a firm has a significant stake in the outcome of the firm's investments, even absent stock ownership, due to risk of a diminished managerial reputation or possible termination. Investments undertaken by the firm expose the CEO to human capital risk, the risk that the CEO's value in the labor market will fluctuate depending on the outcome of investment decisions. There is an incentive, therefore, for a risk-averse CEO to be more conservative in a firm's investment policy than would be preferred by the diversified, risk-neutral owners of the firm. Adding stock

ownership to compensation further reduces the diversification of the CEO with respect to the financial performance of firm investments, and compounds the CEO's risk-aversion in anticipated investment decisions. Thus, this solution to the moral hazard problem of agency, namely risk-sharing via agent ownership, does not solve, and may in fact exacerbate, the divergence of risk preferences between shareholders and the CEO. A CEO may not select the highest possible NPV project from the set available in order to reduce the outcome variance of the project and lower personal risk.

Milgrom and Roberts (1992) posit stock options as a solution to this divergence in risk preference between the CEO and the owners of the firm. When the owner wishes to induce risk-taking by the agent, the optimal pay structure takes the form of a call option, where downside risk is limited and upside potential is high (Milgrom and Roberts 1992, p. 431).[16]

The Impact of Option Grants on Firm Value

Stock option compensation is designed to motivate executive effort in the search for, and development of value-increasing investment opportunities.[17] This mechanism is driven by two primary derivatives of option grant value, namely, sensitivity to stock price and sensitivity to return volatility. Higher sensitivity of compensation to stock price should induce increased executive effort in the search for positive NPV projects that increase stock price. Higher sensitivity to equity risk is also hy-

[16] Milgrom and Roberts (1992) also point out the requirement for some form of capital rationing in this situation to prevent excessive risk-taking.

[17] This is a different role for executive effort than posed by the standard agency problem in that this effort is multi-dimensional (both search and development effort are required), and increased effort does not necessarily shift the

pothesized to generate effort in search of positive NPV projects, but also generates additional incentive to pursue projects that have higher variance in project returns. Increased variance in project returns is appealing to executives compensated with options, since the value of stock options increases in return variance.[18] Increased effort in the search for and development of high return-variance projects will generate more investment opportunities with increased levels of risk (defined as variance in returns) than would be available in the absence of such an incentive. Ceteris paribus, increasing sensitivity to price alone would provide an incentive to increase the value of the firm by developing positive NPV projects. However, increased sensitivity to equity risk is expected to result in an even larger set of investment opportunities, given the increased level of risk in investment opportunities that would be acceptable to the CEO.

Several studies have investigated the relationship between stock options and firm risk. DeFusco, Johnson, and Zorn (1990) found a positive association between the adoption of an executive stock option plan and increased stock return variance. Guay (1999) documents a positive association between the sensitivity of compensation to equity risk and the annualized standard deviation of stock returns. These results indicate that stock option compensation is consistent with increased managerial risk-taking.

This study tests for the effectiveness of option grants in increasing firm value, a result of expansion in the investment opportunity set of the firm. Effectiveness is measured by investor expectations that form and are embedded in stock price. Ceteris

---

outcome distribution to the right in terms of first-order stochastic dominance. Lambert (1986) provides an analysis of the agency problem in risky project selection.

[18] Increased variance results in an increased range of potential gains from the option, while losses on options are bounded below at zero.

paribus, firms that offer option grants should exhibit a greater value in the year after granting the options relative to their value subsequent to non-grant years. Thus, the following hypothesis is tested:

H1: Option grants to CEOs are associated with an increase in market value.

Hypothesis 1 is based on the assumption that CEOs influence the size and composition of a firm's investment opportunity set. There exists the potential for simultaneity in considering the causal relationship between option grants and the investment opportunity set. Previous research indicates that compensation boards base option grants on contemporaneous knowledge of the firm's investment opportunity set IOS, with the expectation that option grants will motivate CEOs to develop existing growth opportunities (Gaver and Gaver 1993a; Janakiraman 1998; Smith and Watts 1992). However, the compensation board is not likely to have complete information on the set of real options available to a CEO, but may wish to motivate the executive to take more risks in seeking and developing these investments. This means that the investment opportunity set is not only a basis for an option grant, but may be the result of a grant as well. The current study considers temporal precedence between the option grant and subsequent measurement of return as a control for this simultaneity.

The Influence of Option Grant Sensitivity on Firm Value

From a purely incentive perspective, a compensation committee, acting in the shareholders' best interests, may grant stock options for one of two reasons: (i) to offset decreases in risk-taking incentives from a desired level, arising from a change in the

CEO's compensation package (e.g., when CEO exercises some existing stock options), or (ii) to increase risk-taking incentives from existing levels. Core and Guay (1999) found evidence to support the hypothesis that on average, options are granted with characteristics to offset deviations from an optimal level of exposure to stock price. Such a deviation would result when a CEO exercises existing stock options and/or sells shares of stock. Ofek and Yermack (2000) found that CEOs sell stock as part of a self-managed hedging program to reduce the level of unsystematic risk to which they are exposed. Taken together, the findings of Core and Guay (1999) and Ofek and Yermack (2000) support the existence of a stable level of incentive. If stock options are granted in order to maintain an optimal level of incentive, the existence of an equilibrium between grants, investment risk and firm value would argue against option grants having a valuation impact.

"Stable" firms are defined as those that maintain a relatively constant level of total stock-option related CEO incentives before and after a stock option grant. Thus, the following hypothesis is tested.

H2: For firms appearing to maintain stable levels of sensitivity to stock price in the CEO's portfolio, there is no significant association between firm value and the grant of stock options.

However, as previously noted, not all firms are likely to maintain stable sensitivities. Compensation committees may not be in a position to determine accurately the incentive impact of the CEO's compensation structure and/or may not be in a position to assess the valuation of stock-based instruments from their CEO's perspective.

Moreover, options are sometimes granted for reasons other than their attendant incentive effects.

For "trend" or disequilibrium firms, where sensitivity increases over time, the influence of option grants on risk-taking is predicated on the increased sensitivity to equity risk that options generate when they are added to a CEO's portfolio. Therefore, it is expected that the risk-taking incentives vary directly with the sensitivity of the option grant to equity risk.

Compensation boards can manipulate sensitivity incentives, thereby optimizing the impact of existing CEO portfolios (Core and Guay 1999). However, this manipulation is implemented through current option grants. Hypothesis 3 investigates the relationship between the level of incentive generated by the option grant and subsequent firm value.

H3: For firms not appearing to maintain stable sensitivity to stock price in the CEO's portfolio (trend firms), subsequent returns vary directly with the sensitivity of a CEO's option grant to equity risk.

The first three hypotheses are interrelated and approach the relationship among option grants, sensitivity to equity risk, and the returns on stock price from multiple angles, while holding existing portfolio incentives constant. These tests of *individual option grants* distinguish this study from prior work which examined total portfolio equity risk incentives (Guay 1999). In addition, by segregating incentive restoration grants and incentive trending grants, this study isolates the conditions under which the effectiveness of option grants can be directly tested. It is important to note, however, that Hypothesis 3 does not address the impact of the interaction among the incentive

effects of new options granted and those of other components in the CEO's compensation package.

The Effects of Interaction Between Option Grant and Portfolio Sensitivity

While the existing portfolio of a CEO is not under the direct control of the compensation board, the implications of this portfolio for the incentive effects of stock option grants are significant (Lambert et al. 1991). The incentive effectiveness of a current option grant is affected by the characteristics of an executive's existing portfolio of wealth. Hypotheses 4 and 5 address the characteristics of the CEO's existing portfolio that are anticipated to influence the effectiveness of contemporaneous option grants, regardless of the status of the firm with respect to equilibrium of incentives.

The argument by Milgrom and Roberts (1992) that stock option compensation triggers increased risk-taking in investments by risk-averse executives is appropriate when the option is analyzed on a stand-alone basis. LLV (1991), however, examined the implications for the incentives generated by an option when the executive's compensation consists of other, fixed wealth as well as contingent payments whose value is correlated with that of the option. LLV suggested that the interrelationship between the incentives in the option grant and the other two components of the compensation contract, fixed wealth and correlated contingent compensation, alter the value of the option grant to the recipient. In theoretical analysis, LLV found that the value of the option compensation to the recipient increases weakly in the level of fixed wealth, and decreases weakly in the sensitivity of other contingent compensation to the performance parameter on which the value of the option is based. Thus, when evaluating the incen-

tive impact of option compensation, the content of the entire compensation package must be considered.

Correlated Wealth

The value to the executive of current compensation differs from the value of the compensation to the firm. Market imperfections exist which can lower the value to the executive of a stock option below the value that is computed for financial statement purposes.[19] The two primary market imperfections are the relative non-liquidity of employee stock options and the inability of executives to diversify the investment that employee stock options represent. CEOs may not sell their stock options, nor hedge them, generally speaking.[20]

When evaluating the incentives of a stock option, therefore, it is important to consider the executive's existing portfolio of wealth in addition to current stock option compensation, and how that portfolio value changes with stock price. The liquidity and diversification constraints affect the value of stock options to executives such that the value to an executive of a current stock option depends on how the balance of the executive's portfolio changes with the stock price, which also drives the value of the option grant. As a result of this covariance, there is an inverse relationship between the value of the current option grant and the degree to which the value of the existing portfolio varies with stock price (Lambert et al. 1991). Higher correlation between the

[19] FAS123R (December 2004) specifies new reporting requirements for stock option compensation. Effective with annual reporting periods ending after July 2005, firms must recognize as compensation expense the fair value of stock options granted.

[20] Hemmer (1993) examines hedged option compensation, such that moral hazard is precluded and the contract is risk free to the executive.

value of existing wealth and the value of the current option grant results in a lower level of CEO wealth diversification. Thus, current compensation that is sensitive to stock price variance further reduces diversification in the executive's portfolio of existing wealth that is sensitive to stock price variance, and induces risk-aversion. For example, a CEO with $10 million in compensation, of which $5 million is sensitive to stock price, has a compensation portfolio sensitivity ratio of 0.50. An additional $2 million in stock-price-sensitive compensation will change this ratio to 0.57. As a result, the CEOs exposure to stock price changes has increased since the proportion of pay that is sensitive to stock price has increased. This finding implies that the incentives imbedded in equity risk-sensitive option grants are attenuated and perhaps offset by the risk-aversion that is generated through reduced diversification of equity risk-sensitive existing holdings. If, on the whole, a grant is expected to result in a reduction in firm value, an efficient compensation committee would not be expected to award the grant. However, if the portfolio considerations attenuate, but do not entirely offset the incentives in the grant, the compensation committee may still award the grant for incentive purposes. Thus, in a manner consistent with the LLV prediction, the following hypothesis is considered:

H4: Higher equity risk sensitivity of a CEO's existing portfolio attenuates the relationship between the sensitivity of the current option grant and subsequent returns.

Unrelated Wealth

Managerial risk aversion is decreasing in managerial wealth. LLV analytically demonstrated that, for a manager with a utility function exhibiting non-increasing abso-

lute risk-aversion, even when existing wealth has a stochastic component, the value of an uncertain payoff is increasing in unrelated wealth. For example, for an individual who takes more risk when wealthier (decreasing absolute risk-aversion), the value of a lottery increases with existing wealth. In the context of executive compensation, a high level of existing executive wealth that is not contingent on the CEO firm's stock price or volatility is therefore expected to supplement the motivation for risk-taking imbedded in the current option grant. The following hypothesis is proposed:

H5: A higher level of unrelated wealth in a CEOs existing portfolio strengthens the relationship between the sensitivity of the current option grant and subsequent returns.

CHAPTER IV

DATA AND RESEARCH SAMPLE

Data

The source of data for this study is Standard and Poor's Execucomp database. Stock option compensation data was collected on all Firm/CEO combinations contained in the Execucomp database for the years 1992-2002 where firms granted stock options to the CEO at least once. The Execucomp database contains compensation data from proxy statements for the S&P 500, the S&P mid-cap 400, and the S&P small-cap 600 firms. Execucomp provides data on the compensation of each firm's top five executive officers; however, this study focuses on CEO compensation only. The data in the Execucomp database is obtained from Compustat, and an audit of Execucomp found a one-to-one match with the Compustat database in the audit sample for the variables used in this study. Stock return variance data was collected from Execucomp also. This study uses the Black-Scholes volatility statistic, which is the Execucomp-computed standard deviation volatility, calculated over 60 months. This volatility calculation is used to compute Black-Scholes values for option grants in Execucomp. This study also uses the Black-Scholes dividend yield contained in the Execucomp database as the dividend yield for calculating grant and portfolio sensitivities.

Sample Selection

The sample used in this study consists of all firms in the Execucomp database granting stock options to CEOs at least once during the years 1992-2002. This sample consists of 2,349 firms, which represents almost 90% of the firms whose data are reported in Execucomp over the eleven year period. Table 1 provides descriptive statistics pertaining to industry for the firms that comprise this sample. For tests of Hypotheses 1 and 2, which investigate the impact of option grants on subsequent firm value, this sample provides 14,428 firm years of data out of a possible 18,792 observations. The sample size is diminished by missing data. Table 2 describes sample selection steps that generated the data used in tests of Hypotheses 1 & 2. Outlier observations are identified based on the variables constructed for and used in the regression analyses. Outlier treatment is not applied to raw data, but is applied to variables before they are included in the regression models. Table 2 reconciles the total potential firm years with the number of firm years used in the regression analyses.

Table 1

Descriptive Statistics of Sample Firms

No.	Two-Digit SIC Code	Industry	Freq.	Percen	Cum. Freq.	Cum. Percent
1	10 – 14	Mining, Oil and Gas Extraction	96	4	96	4
2	15 – 17	Construction	25	1	121	5
3	20 – 21	Food and Kindred Products, Tobacco	56	2	177	7
4	22 – 23	Textiles and Apparel Manufacturing	34	1	211	8
5	24 – 26	Lumber, Furniture, Paper and Allied Products	57	3	268	11
6	27	Printing, Publishing, and Allied Industries	36	2	304	13

Table 1 continued

No.	Two-Digit SIC Code	Industry	Freq.	Percen	Cum. Freq.	Cum. Percent
7	28	Chemicals and Allied Products	145	6	449	19
8	29	Petroleum Refining and Related Ind.	23	1	472	20
9	30 – 34	Rubber, Plastic, Primary Metal Ind.	115	5	587	25
10	35 – 36	Ind. and Comm. Machinery, Computer Equipment, Electronic and Electrical Equipment and Components	317	13	904	38
11	37 – 39	Transportation Equipment, Medical Equipment, Controls, and Misc. Manufac-turing	190	8	1094	47
12	40 – 47	Transportation	64	2	1158	49
13	48	Communications	71	3	1229	52
14	49	Electric, Gas and Sanitary Services	127	6	1356	58
15	50 – 59	Retail	252	11	1608	69
15	60 – 62	Financial Services	215	9	1823	78
16	63 – 69	Insurance and Real Estate	146	6	1969	84
17	70 – 89	Services	366	15	2335	99
18		Other	14	1	2349	100

Table 2

Sample Selection Hypotheses 1 & 2

Screen Procedure		
Firms Granting Options 1992-2002	2,349	
Firm Years in 1994-2001	18,792	
Less Firm Year outliers deleted	881	
Less Firm Years with missing data	3,483	*
Total Sample for Hypotheses 1& 2	14,428	

* Firms leaving the database before 2001 or entering after 1992 resulted in the majority of these observations.

Table 3 provides a distribution of the firm-year observations by year. The firm year observations are evenly distributed over the timeframe of the analysis, with each year containing between 10% and 12% of the total firm-year observations. There are two significant factors to note in Table 4. The first is the monotonic increase in the percent of firm-years with option grants in the prior year. This is consistent with the increased use of stock options as a compensation instrument over this timeframe. In 1994, 34.5% of firms' CEOs had received option grants in the prior year. By 2002, this percentage had risen to 78.7%. The second significant observation is the sharp decline in the number of firm-years in the sample from 1998 to 1999 and again from 1999 to 2000. The net change from 1998 to 1999 is comprised of 157 firms dropping out of the sample and 37 new firms entering the sample. The net change from 1999 to 2000 is comprised of 103 new firms in the sample and an attrition of 198 firms. During these

periods there was substantial turnover of firms in the sample. Firms would drop out of the sample if they failed or were acquired by another firm.

The test of Hypothesis 2 uses available grant and portfolio sensitivity data to identify firms that demonstrate an increasing sensitivity to equity risk. All others are considered to be incentive equilibrium firms, even if such categorization obtains by default as a result of missing data.

Table 3

Distribution of Grants by Year

Year	Percent of Firm-Years With Option Grants In the Prior Year	Number of Firm-Years	Percent of Total Firm-Years	Cumulative Frequency	Cumulative Percent
1994	34.5%	1616	11.2%	1616	11.2%
1995	38.4%	1693	11.7%	3309	22.9%
1996	40.5%	1727	12.0%	5036	34.9%
1997	46.4%	1717	11.9%	6753	46.8%
1998	53.2%	1699	11.8%	8452	58.6%
1999	61.1%	1579	10.9%	10031	69.5%
2000	65.9%	1484	10.3%	11515	79.8%
2001	72.2%	1461	10.1%	12976	89.9%
2002	78.7%	1452	10.1%	14428	100.0%
Total		14428	100.0%		
Mean	53.7%	1603			

The sample used in this study for tests of Hypotheses 3-5 also consists of Execucomp firms that granted options during the 1992-2002 timeframe. This sample contains 6,158 firm-years for grants from 1993 through 2001. The reduction in sample size from that used in tests of Hypotheses 1 & 2 is largely due to data limitations for

calculation of sensitivity to equity risk. Also, firm-years without grants in the prior year are excluded from this sample. Table 4 describes sample selection steps that generated the data used in tests of Hypotheses 3 through 5. As in tests of Hypotheses 1 & 2, outlier identification and treatment is based on the variables constructed for and used in regression analyses.

Table 4

Sample Selection Hypotheses 3, 4 & 5

Screen Procedure	
Firms Granting Options 1992-2002	2,349
Firm Years in 1994-2001	18,792
Less Firm Years with missing financial data	5,412
Less Firm Years without prior year grants	6,606
Less Outlier observations discarded	616
Total Sample for Hypotheses 3-5	6,158

CHAPTER V

METHODOLOGY

Model

The Ohlson (1991) framework explicates the relationship between accounting identities and market value and is used to model the relationship between firm value and the characteristics of option grants. In the context of the Ohlson model, the association among option grants, portfolio characteristics, and firm value is measured by the information value of the grant and portfolio characteristics. The Ohlson model is valuable here because it considers book values and earnings as components of firm value. Following Ohlson, Amir (1993) provides the model that is applied in this research. The Amir specification is as follows:

$$P_t = \alpha_0 BV_{t-1} + \alpha_1 NI_t + \alpha_2 BV_t + \beta \mathbf{V}_t + \eta_t,$$

where P is the market value per share of common stock; BV is the book value of equity, on a per-share basis; NI is the firm's earnings per share over period (t–1,t); and **V** is a vector of information variables, other than book value and net income, that may be value-relevant in pricing the firm.

Application of the Ohlson model requires the researcher to address scale effects in research design. Scale effect is the result of overwhelming influence by the largest firms in a sample for statistical analysis involving a cross-section of firms. Amir ad-

justs for potential heteroskedasticity by deflating all variables in the model by the prior period book value of equity.

Substantial debate surrounds the issue of controlling for scale effects. Kothari and Zimmerman (1995) support price models as yielding less biased coefficient estimates, although they leave the specification subject to more serious heteroskedasticity and other econometric problems. They suggest enriching studies by testing them for sensitivity to functional form. This study adopts a returns model for the main tests. Chapter VII presents an analysis of the sensitivity of these research results to the alternate model specification using price as the dependent variable in a levels model.

This study employs the Amir specification of the Ohlson model, with the exception of scaling independent variables by sales. The model used in this study is as follows:

$$P_t / P_{t-1} = \alpha_0 + \alpha_1 BV_t/Sales_t + \alpha_2 NI_t/Sales_t + \beta \mathbf{V}_t/Sales_t + \eta_t,$$

where P_t is the market value per share of common stock at time (t); P_t / P_{t-1} is a variable that represents the return on the firm's stock over the period (t–1, t); BV_t is the book value of equity per share, at time (t); NI_t is the firm's earnings per share over period (t–1,t); sales is the net sales per share for the firm in year (t); and **V** is a vector of information variables at time (t). In this study, **V** varies depending on the hypothesis being tested. Appendix A defines the variables that comprise **V**. Tables of results provide detailed specifications of the models employed, including the variables that comprise **V**

in the pertinent test. Consistent with the Amir model, this study deflates continuous information variables to per-share values.

The Ohlson model employs both current and lagged book value of equity. For empirical tests, however, the high correlation between current and lagged book value of equity subjects the empirical results to severe multicollinearity. Variance inflation factors, when current and lagged book values are present in the model, exceed 11, which causes inferences about the related variable coefficients to be unreliable. The model used in this study excludes the prior (lagged) book value of equity. The absence of this variable inflates the significance of the intercept in this model but results in more reliable coefficient estimates.

Variable Construction

Dependent Variable

The dependent variable used in tests of Hypotheses 1 through 5 is the raw return on the stock from the beginning of the year of disclosure of stock option grant information in the firm's 10k to the end of that fiscal year. Hypotheses 3 through 5 are based on information whose disclosure is limited to the firm's 10k. Thus, interim disclosures, while they may be of value in determining the existence of a grant, are insufficient to enable assessment of the sensitivity of the grant or the extant CEO portfolio to equity risk.

The impact of the dichotomous independent variable, grant or no grant, is more clearly identified and tested using a change in market value, a returns metric, as opposed to using the level of market value. Sensitivity analysis demonstrates a similar

result, however, when the dependent variable is measured as the level of market value per share. The results for a levels model, as well as the results of sensitivity tests of using size-adjusted returns are presented in Chapter VII.

Independent Variables—Ohlson Framework

The earnings variable (NI) is the net income for the current year on a per share basis. Book value (BV) is the current year-end book value per share. Prior period BV, present in the Ohlson model, is not included in the model specification for this research. As previously discussed, a high correlation between prior and current BV generates a significant problem with multicollinearity, when both variables are present in the model.

Independent Variables—Information Variables

Sensitivity of an option grant to equity risk is calculated using the one year approximation method following Core and Guay (2002). The partial derivative of a grant option's Black-Scholes value at the time of the grant, with respect to a 1% change in the standard deviation of stock returns is computed and multiplied by the number of options in the grant to generate the sensitivity variable. The sensitivity of a CEO's portfolio to equity risk is the aggregation of the sensitivities to equity risk of all of the stock and option holdings in the portfolio at the beginning of the year. The Core and Guay (2002) methodology is used for estimating portfolio incentives from stock and option sensitivities. Appendix C details the methodology used in this study for the calculation of all stock and option-related sensitivities.

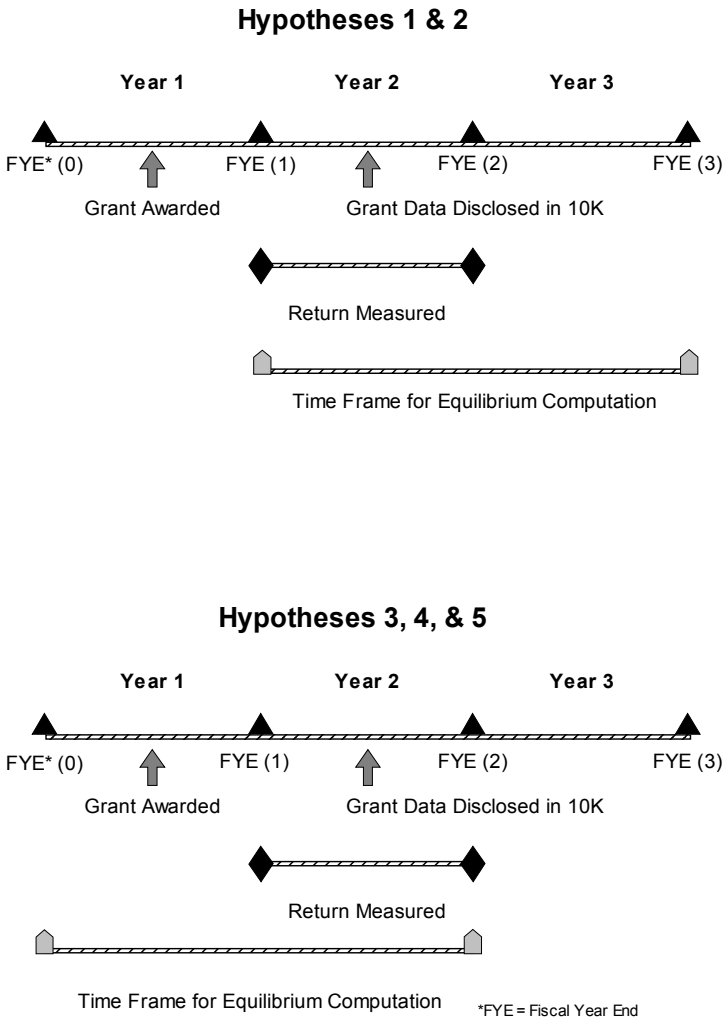

Exhibit 1: Timeline of Option Grants, Disclosure, and Measurement of Return

Unrelated executive wealth in the immediately prior period (URW) is implemented using as a proxy the prior year salary to the CEO. A higher level of cash in compensation allows a CEO more opportunity to diversify holdings. LLV demonstrated that the value of a compensation contract is increasing in the fixed, i.e., non-

correlated, component of wealth. This relationship arises as a result of risk-aversion being a decreasing function of the fixed (non-correlated) component. A CEO's salary is the component of compensation that is least correlated with firm performance, as compared with bonuses, stock holdings or grants, and stock option holdings and grants. As a result, salary is the most appropriate proxy for unrelated wealth.

Adopting a proxy for unrelated wealth to use in this context is problematic because CEO wealth is not generally available, and attempts to estimate it require a substantial amount of estimation of very idiosyncratic parameters such as spending versus savings patterns and personal investment preferences. Thus, this study does not attempt to extrapolate CEO wealth from past years salaries, age and tenure, but, instead relies on prior year salary as a proxy for CEO non-correlated wealth.[21] Models of CEO wealth that could be empirically validated would enhance research in this area significantly.

Incentive stability conditions are evaluated based on three-year trends in the CEO's portfolio sensitivity to stock price. Exhibit I provides a timeline of the period over which grants are awarded, grant data is disclosed in the 10K, returns are measured, and the timeframe over which equilibrium status is measured. Firms whose CEO's portfolio sensitivity to stock price increases more than 5% annually, or at least 10% overall are categorized as Case 1, constantly increasing sensitivity. Firms whose CEO's portfolio sensitivity to stock price declines by at least 5% per year, or at least

[21] The acknowledged limitation of this proxy for non-correlated wealth is a limitation of this study. If this proxy is inappropriate, in that it does not capture the level of non-correlated wealth, this study will be biased against finding a significant interaction between this variable and option grant sensitivity.

10% overall, are categorized as Case 2, consistently decreasing sensitivity. Firms that demonstrate an increase (decrease) of at least 5% followed by a decrease (increase) of at least 5%, but do not change in excess of 5% overall, are categorized as Case 3, stable sensitivity. Firms demonstrating a stable sensitivity to stock price in executive stock and option portfolios, and all other firms that did not meet the criterion for Case 1, are categorized as stable firms.

In tests of Hypotheses 3-5, where all firm-year observations have grants to the CEO in the prior year, the measurement of equilibrium is computed based on portfolio sensitivity to equity risk beginning in the year before the grant and ending in the year following the grant.[22] Of the 6158 firm-years in this study for which case criteria are available, 2,559 observations (41.5%) are disequilibrium Case 1 firm years that demonstrate consistently increasing CEO portfolio sensitivity. Another 399 (6.5%) are disequilibrium Case 2 firm years that demonstrate consistently decreasing sensitivity, and 3200 firm years (52.0%) are categorized as stable incentive equilibrium firm years.

In tests of Hypotheses 1 & 2, where it is not a constant that all firm-year observations have grants to the CEO in the prior year, the measurement of equilibrium is computed based on portfolio sensitivity to equity risk beginning in the year immediately following the grant and ending in the year following the grant disclosure, two years after the grant.[23] This deferred assessment period is necessary due to the high correlation between not granting options in the prior year and not being classified as a

[22] Refer to Exhibit I for a schematic representation of the timeframes for computation of equilibrium status.
[23] Refer to Exhibit I for a schematic representation of the timeframes for computation of equilibrium status.

disequilibrium firm. A firm that does not grant options is effectively barred from demonstrating an upward trend in CEO portfolio sensitivity. Thus, including the year of (no) grant in the computation biases the observation toward being an equilibrium firm. In order to detect differences between firms that are independent of the decision to grant options in the prior year, this study measures the equilibrium status using an independent time-frame. Using this time-frame, 36.2% of observations (5,235) are disequilibrium Case 1 firm years that demonstrate consistently increasing CEO portfolio sensitivity. All other firm-years (63.8%) are classified as equilibrium firms. It should be noted that, using this methodology, equilibrium status may have obtained as a result of missing data. A bias toward equilibrium, however, would be expected to bias the results in this study against a significant finding on the relationship between disequilibrium status and returns.

Table 5 provides descriptive statistics for the variables used in tests of Hypotheses 1 and 2 of this study. The return, BV/sales and NI/sales variables were deleted at 1% and 99% to control for the influence of extreme values.

Table 6 provides descriptive statistics for the variables used in tests of Hypotheses 3 through 5 of this study. Outlier observations for the return, BV/sales, NI/sales, unrelated wealth, POGSTER (prior option grant sensitivity to equity risk) and POPSTER (prior option portfolio sensitivity to equity risk) variables were deleted at 1% and 99% to control for the influence of extreme values.

Table 5

Sample Descriptive Statistics (1994-2001).

Hypotheses 1 & 2

N = 14,428

Characteristic		Percentile	Value	Mean
Market Value		75	3184.9	
	Median	50	985.1	5213.6
		25	374.8	
Book Value		75	1270.4	
	Median	50	415.5	1607.0
		25	170.7	
Net Income		75	148.0	
	Median	50	42.7	208.1
		25	10.6	
Sales		75	2866.4	
	Median	50	924.4	3742.7
		25	351.8	
Prior Year Option Grant		75	1.0	
1 = Prior Year Option Grant	Median	50	1.0	.537
0 = No Prior Year Option Grant		25	0.0	
Incentive Disequilibrium		75	1.0	
1 = Incentive Disequilibrium	Median	50	0.0	.363
0 = Incentive Stable		25	0.0	

Table 6

Sample Descriptive Statistics.

Hypotheses 3, 4 & 5

N = 6,158

Firm Characteristic		Percentile	Value	Mean
Market Value		75	4306.91	
	Median	50	1295.07	6400.42
		25	502.66	
Book Value		75	1601.34	
	Median	50	529.39	1884.67
		25	223.94	
Net Income		75	194.98	
	Median	50	56.14	263.84
		25	16.95	
Sales		75	3612.93	
	Median	50	1209.58	4332.30
		25	471.64	
Prior Year Vega–		75	205.68	
CEO option grants	Median	50	77.55	204.25
		25	30.15	
Prior Year Vega-Portfolio		75	303.65	
CEO portfolio holdings	Median	50	124.51	294.58
		25	50.88	
Prior Year Salary		75	656.65	
	Median	50	467.50	518.55
		25	328.27	

Vega: Sensitivity of an option to equity risk; the partial derivative of an option value, computed using the Black-Scholes model, with respect to stock return variance

.

CHAPTER VI

RESULTS

Direct Effect Hypotheses

Hypothesis 1

Hypothesis 1 predicts that the grant of CEO stock options is positively associated with the market value of the firm in the year following the grant. An ordinary least-squares multivariate regression model was used to examine the value relevance of prior-year option grants.

Table 7 provides the statistical analysis of Hypothesis 1. The coefficient estimates and related significance levels for two-tailed tests are presented for all variables. The null hypothesis, that the coefficient on an option grant is less than or equal to zero, cannot be rejected at conventional levels of significance. While the hypothesized association between option grants and firm value is positive, the sign on the coefficient is negative but not statistically significant. This regression parameter (–0.012) is not different from zero with a p-value of 0.1186 (t–value –1.56) for the two-tailed t-test of the null hypothesis. Thus, this study found that the incremental return following the disclosure of option grant information is not significantly different from zero. This study did not find that, overall, option grants are associated with positive future returns.

Executive compensation theory and compensation plans in practice suggest that option grants are valuable to firms. This is predicated on investors' placing value on the incentive impact of options, with the value of the incentives more than offsetting

the cost of the options granted[24]. Failure to find a positive association between option grants and subsequent firm value indicates that market participants may weight the contribution of the grant to executive incentives, and the probability of increased firm value due to increased executive effort in project selection and implementation, as having insufficient value to offset the cost of the option, ceteris paribus.

Table 7

Regression Analysis: Hypothesis 1

Dependent variable	**One Period Return**			
Independent variables	**Predicted sign**	**Coefficient estimate**	**t value**	**p-value**
Intercept		0.914	89.12	0.0001
BV / Sales		–0.008	–1.22	0.2230
NI / Sales		0.365	13.89	0.0001
Prior Grant Indicator (POGIND)	H1: +	–0.012	–1.56	0.1186
N = 14,428				
Adjusted R-squared	0.0659			
F Value	101.75			
Probability	0.0001			

Notes

To control for outliers, all continuous variables are deleted at 1% and 99%.

All t values are calculated on two-tail basis, even if hypothesis supports a one-tail test

Coefficients on yearly indicator variables are suppressed

Variable Definitions:

Return = One-period raw return: fiscal year end (t) price per share / fiscal year end (t–1) price per share

BV / Sales = Book value at year-end (t) / sales for year (t)

NI / Sales = Net income in year/ sales in year (t)

Prior Grant Indicator = 1 if firm grants CEO options in (t–1), else = 0

[24] The cost of the option grant to shareholders includes the incremental compensation to the CEO for bearing additional risk as well as the dilutive effect of the additional shares.

Hypothesis 2

Hypothesis 2 predicts an insignificant association between the value of the firm and stock option grants for firms that are stable with respect to CEO incentives. A multivariate regression model, estimated using ordinary least squares, was used to investigate this hypothesis. The results of this analysis are presented in Table 8. Across all firms in the sample, a prior-year option grant was not associated with increased firm value; however, Table 8 shows that for firms with a stable level of CEO stock-based incentives, the prior grant of stock options is negatively associated with subsequent returns (t-statistic –8.62, p-value .0001). This is different from the relationship noted for the overall sample of stock option grants. The negative impact of stock option grants on firms with equilibrium in CEO incentives is offset by a positive association between stock option grant sensitivity and value for firms with disequilibrium in CEO incentives. The coefficient on the interaction term between disequilibrium and prior grant is positive and significant (t-statistic 8.49, p-value 0.0001).

The relationship between returns and prior period option grants for firms that demonstrate CEO incentive disequilibrium is positive. Table 8 presents results of an F-test of the linear hypothesis that POGIND + POGINT= 0.[25] The sum of the coefficients POGIND and POGINT represents the incremental contribution to return of disequilibrium firm year observations where options were granted in the prior year. The coefficient on the linear combination is positive (0.054) and significant at p = 0.0001. Thus,

[25] POGIND = prior option grant indicator; POGINT = prior option grant interaction with CEO portfolio incentive disequilibrium.

Table 8

Regression Analysis: Hypothesis 2

Dependent variable	One Period Return			
Independent variables	**Predicted sign**	**Coefficient estimate**	**t value**	**p-value**
Intercept		0.931	88.07	.0001
BV / Sales		–0.003	–0.43	.6651
NI / Sales		0.332	12.74	.0001
Prior Grant Indicator (POGIND)	H2: ns	–0.083	–8.62	.0001
Disequilibrium Indicator (DEQIND)		0.039	3.11	.0019
Prior Grant * Disequilibrium (POGINT)		0.137	8.49	.0001
N = 14,447				
Adjusted R-squared	.0844			
F Value	110.69			
Probability	0.0001			
F-test: POGIND + POGINT = 0		0.054		.0001

Notes

To control for outliers, all continuous variables are deleted at 1% and 99%.

All t values are calculated on two-tail basis, even if hypothesis supports one-tail test.

Coefficients on yearly indicator variables are suppressed.

Variable Definitions:

Return = One-period raw return: fiscal year end (t) price per share / fiscal year end (t–1) price per share

BV / Sales = Book value at year-end (t) / sales for year (t)

NI / Sales = Net income in year (t) / sales in year (t)

POGIND: Indicator = 1 if firm grants CEO options in (t–1), else = 0

DEQIND: Indicator = 1 if firm is in incentive equilibrium for year-end (t–2 to t+1), else = 0

POGINT: POGIND *DEQIND

while overall, option grants are not associated with increased subsequent returns, dis-equilibrium status in CEO portfolio incentives attenuates the negative relationship demonstrated by stable-incentive firms, and, in fact, generates a positive relationship between option grants and subsequent returns.

Table 9

Pearson Correlation Matrix

Hypothesis Tests 1 & 2

(p-value)

N = 14,428

	Return	**BV/Sales**	**NI/Sales**	**POGIND**	**DEQIND**
Return	1.00	–0.0124 (.1369)	0.1190 (.0001)	–0.0286 (.0006)	0.1511 (.0001)
BV/Sales		1.00	0.0461 (.0001)	0.0042 (.6108)	–0.0431 (.0001)
NI/Sales			1.00	0.0262 (.0016)	0.0697 (.0001)
POGIND				1.00	0.1982 (.0001)
DEQIND					1.00

Variable Definitions:
Return = One-period raw return (fiscal year end (t) price per share / fiscal year end (t–1) price per share)
BV/Sales = Book value at (t) divided by sales for time (t–1, t)
NI/Sales = Net income per dollar of sales for time (t–1,t)
POGIND: Indicator = 1 if firm grants CEO options in (t–1), else = 0
DEQIND: Indicator = 1 if firm is NOT in incentive equilibrium for year-end (t–2 to t+1)

Table 9 provides a Pearson correlation analysis for the variables used in the tests of Hypotheses 1 and 2. It is interesting to note the significant positive simple correlation between the grant of options and the status of CEO incentive disequilibrium.

This is consistent with the findings of Core and Guay (1999), that options are granted to achieve optimal incentives, and may be expected to increase existing incentives.

Interaction Hypotheses

Hypothesis 3

Hypothesis 3 states that for firms exhibiting incentive disequilibrium, the sensitivity of an option grant to equity risk is positively associated with subsequent firm value. Tables 10 and 11 present the results of the multivariate analyses that test Hypothesis 3. Overall, controlling for portfolio sensitivity and uncorrelated CEO wealth, the information variable representing prior option grant sensitivity to equity risk (POGSTER) is noted to be positively associated with firm value (Table 10: t-statistic 2.03, p-value .0420). However, as indicated by the results in Table 11, the interaction between incentive disequilibrium status of the CEO portfolio and the grant's sensitivity to equity risk is associated with a positive relationship between and firm value (t-statistic 8.05, p-value .0001). The association between grant sensitivity and subsequent returns is insignificant for firms that do not demonstrate trending levels of CEO incentives. Thus, this study supported Hypothesis 3, finding a positive, significant association between option grant sensitivity and subsequent returns for firms where the CEO portfolio is trending upward over time. While overall the association between option grant sensitivity and firm value is positive and significant, this study provided evidence that increased grant sensitivity is of value only for the subset of firms where CEO portfolio sensitivity has not established a stable level, but is increasing over time.

Table 10

Regression Analysis: Grant Sensitivity

Dependent Variable	One Period Return			
Independent Variables	**Predicted sign**	**Coefficient estimate**	**t value**	**p-value**
Intercept		0.878	63.74	.0001
BV / Sales		0.009	0.73	.4662
NI / Sales		0.345	8.19	.0001
POGSTER	?	0.054	2.03	.0420
Control Variables:				
POPSTER		–0.105	–5.95	.0001
Uncorrelated Wealth		0.035	6.36	.0001
N = 6158				
Adjusted R-squared	0.0797			
F Value	44.32			
Probability	0.0001			

Notes

All continuous variable outliers are deleted at 1% and 99%.

All t values are calculated on two-tail basis, even if hypothesis supports one-tail test.

Coefficients on yearly indicator variables are suppressed.

Variable Definitions:

Return = One-period raw return: fiscal year end (t) price per share / fiscal year end (t–1) price per share

BV/Sales = Book value at year-end (t) / sales for year (t)

NI/ Sales = Net income in year (t) / sales in year (t)

POGSTER = Sensitivity to equity risk of CEO options granted in year (t–1)

POPSTER = Sensitivity to equity risk of CEO portfolio at year-end (t–1)

Uncorrelated Wealth = CEO salary in year (t–1) scaled by sales in year (t)

Table 11

Regression Analysis: Hypothesis 3

Dependent Variable	One Period Return			
Independent Variables	**Predicted sign**	**Coefficient estimate**	**t value**	**p-value**
Intercept		0.886	65.34	.0001
BV / Sales		0.008	0.63	.5261
NI / Sales		0.321	7.76	.0001
POGSTER		–0.122	–4.22	.0001
POGSTER*DEQIND	H3: +	0.527	14.46	.0001
Control Variables:				
POPSTER		–0.075	–4.30	.0001
Uncorrelated Wealth		0.029	5.18	.0001
N = 6158				
Adjusted R-squared	.1099			
F Value	58.37			
Probability	.0001			

Notes

All continuous variable outliers are deleted at 1% and 99%.

All t values are calculated on two-tail basis, even if hypothesis supports one-tail test.

Coefficients on yearly indicator variables are suppressed.

Variable Definitions:

Return = One-period raw return: fiscal year end (t) price per share / fiscal year end (t–1) price per share

BV/Sales = Book value at year-end (t) / sales for year (t)

NI/ Sales = Net Income in year (t) / sales in year (t)

POGSTER = Sensitivity to equity risk of CEO options granted in year (t–1)

POPSTER = Sensitivity to equity risk of CEO portfolio at year-end (t–1)

Uncorrelated Wealth = CEO salary in year (t–1) scaled by sales in year (t)

DEQIND: Indicator variable = 1 if firm exhibits disequilibrium in incentives (t–2,t+1), else = 0.

Hypothesis 4

Table 12 provides results of analysis performed to test Hypothesis 4, namely, that there is a significant negative relationship between the interaction of grant and portfolio sensitivity and firm value. From Table 13 it can be noted that each of these independent variables is individually negatively correlated with returns. However, Hypothesis 4 was not supported at conventional levels of significance (t-statistic 0.65, p-value .5155). This indicates that overall portfolio sensitivity cannot be shown to interact with grant sensitivity to influence firm value. This is surprising, in that the diversification argument is powerful, and used in many studies to support the notion that risky pay such as stock options is more costly for a firm.[26]

Additional analysis is presented in Table 14, further decomposing the interaction between portfolio and grant sensitivities and the impact of this interaction on returns. While overall the impact of this interaction is not significant, as demonstrated in Table 12, for the subset of firms that demonstrate disequilibrium in CEO portfolio incentives, the interaction was shown to be negative and significant (t-statistic = –2.17, p-value .0300). This finding supports the LLV prediction that high levels of portfolio sensitivity to equity risk attenuate the positive impact of an option grant's sensitivity, but this relationship is noted only for firms that demonstrate CEO incentive disequilibrium.

[26] For example, Meulbroek (2001) uses the limits to diversification argument to measure the deadweight cost between cost of options to the firm and value of options to the executive.

Table 12

Regression Analysis: Hypotheses 4 & 5

Dependent Variable	One Period Return			
Independent Variables	**Predicted sign**	**Coefficient estimate**	**t value**	**p-value**
Intercept		0.890	63.34	.0001
BV / Sales		0.009	0.72	.4737
NI / Sales		0.369	8.70	.0001
POGSTER		–0.018	–0.53	.5985
POGSTER * POPSTER	H4: –	0.013	0.65	.5155
POGSTER * Uncorrelated Wealth	H5: +	0.038	3.71	.0002
Control Variables:				
POPSTER		–0.116	–5.38	.0001
Uncorrelated Wealth (URW)		0.024	3.55	.0004
N = 6158				
Adjusted R-squared	.0827			
F Value	39.56			
Probability	0.0001			

Notes

All continuous variable outliers are deleted at 1% and 99%.

All t values are calculated on two-tail basis, even if hypothesis supports one-tail test.

Coefficients on yearly indicator variables are suppressed.

Variable Definitions:

Return = One-period raw return: fiscal year end (t) price per share / fiscal year end (t–1) price per share

BV / Sales = Book value at year-end (t) / sales for year (t)

NI / Sales = Net income in year (t) / sales in year (t)

POGSTER = Sensitivity to equity risk of CEO options granted in year (t–1)

POPSTER = Sensitivity to equity risk of CEO stock and option portfolio at year-end (t–1)

Uncorrelated Wealth = CEO salary in year (t–1) scaled by shares outstanding

Table 13

Pearson Correlation Matrix

Hypothesis Tests 3, 4, & 5

(p-value)

N = 6,158

	Return	**Book Value/ Sales**	**Net Income/ Sales**	**Prior Grant Vega/ Sales**	**Portfolio Vega/Sales**	**Prior Salary /Sales**
Return	1.00	–0.0001 (.9982)	0.1084 (.0001)	–0.0278 (.0294)	–0.0665 (.0001)	0.0161 (.2078)
Book Value/Sales		1.00	0.0469 (.0002)	0.3257 (.0001)	0.4072 (.0001)	0.3535 (.0001)
Net Income/Sales			1.00	–0.0521 (.0001)	–0.1347 (.0001)	–0.2693 (.0001)
Prior Grant Vega/Sales				1.00	0.7003 (.0001)	0.3126 (.0001)
Portfolio Vega/Sales					1.00	0.5404 (.0001)
Prior Salary/ Sales						1.00

Variable Definitions:
Return= One-period raw return (fiscal year end (t) price per share / fiscal year end (t–1) price per share)
BV/Sales = Book Value at (t) divided by Sales for time (t–1, t)
NI/Sales = Net income per sales per dollar for time (t–1,t)
Prior Grant Vega/ Sales = Sensitivity to equity risk of CEO options granted in year (t–1)), scaled by sales
Portfolio Vega/ Sales = Sensitivity to equity risk of CEO stock & option portfolio at year-end (t–1)), scaled by sales
Prior Salary / Sales = CEO salary in year (t–1), scaled by sales

Table 14

Interaction Between Grant and Portfolio Sensitivity and Incentive Trend Status

Dependent Variable	One Period Return			
Independent Variables	**Predicted sign**	**Coefficient estimate**	**t value**	**p-value**
Intercept		0.836	57.86	.0001
BV / Sales		0.007	0.57	.5668
NI / Sales		0.269	6.58	.0001
POGSTER		–0.033	–0.83	.4044
DEQIND		0.172	12.50	.0001
POGSTER*POPSTER	H4: –	0.040	1.95	.0514
DEQIND*POGSTER		0.072	1.03	.3014
DEQIND*POPSTER		0.267	6.23	.0001
DEQIND*POGSTER*POPSTER		–0.086	–2.17	.0300
POGSTER * URW	H5: +	0.015	1.52	.1282
Control Variables:				
POPSTER		–0.142	–6.35	.0001
Uncorrelated Wealth (URW)		0.029	4.35	.0001
N = 6158				
Adjusted R-squared	.1519			
F Value	62.27			
Probability	0.0001			

Notes
All continuous variable outliers are deleted at 1% and 99%.
All t values are calculated on two-tail basis, even if hypothesis supports one-tail test.
Coefficients on yearly indicator variables are suppressed.

Variable Definitions:
Return = One-period raw return: fiscal year end (t) price per share/fiscal year end (t–1) price per share
BV / Sales = Book value at year-end (t) / sales for year (t)
NI / Sales = Net income in year (t) / sales in year (t)
POGSTER = Sensitivity to Equity Risk of CEO Options granted in year (t–1) scaled by sales in year (t)
POPSTER = Sensitivity to equity risk of CEO stock and option portfolio at year-end (t–1) scaled by sales in year (t)
URW (Uncorrelated Wealth) = CEO salary in year (t–1) scaled by sales in year (t)
DISEQIND = indicator variable = 1 if firm exhibits disequilibrium in incentives (t–2,t+1), else = 0

Hypothesis 5

Hypothesis 5, that there is a significant positive relationship between the level of CEO salary, as a proxy for unrelated wealth, and the incentive and value impact of stock option grants, was supported by this research. Table 12 provides the results of statistical analysis of this hypothesis. The coefficient on the interaction between option grant sensitivity and uncorrelated wealth is positive and significant (t-statistic 3.71, p-value .0002) As a main effect, unrelated wealth, using prior-period CEO salary as a proxy, was positively associated with firm value (t-statistic 3.55, p-value .0004). However, in the presence of higher CEO salary, the incentive impact of stock option compensation is increased. Thus, the results of this study suggest that the inclusion of stock option incentives in the compensation program has a positive association with firm value, by adding risk-taking incentives to a compensation scheme that is heavily insured. These findings are consistent with LLV, providing empirical support for their analysis of the interaction between stock option grant incentives and those provided by a CEO's uncorrelated wealth.

Summary

This study found that stock option grants are not universally associated with firm value. However, the sensitivity of CEO stock option grants is positively associated with firm value for the sub-sample of firm-years that exhibit CEO incentive disequilibrium. This suggests that stock option grants which move the CEO's portfolio of incentives for risk-taking to a higher level (a situation labeled disequilibrium in this study) are value-enhancing for a firm.

Additional value in stock option sensitivity was found in the interaction between option grant incentives and high levels of unrelated CEO wealth. This analysis found that high sensitivity in option grants appears to mitigate lower risk-taking incentives that could be generated by high levels of unrelated CEO wealth. This interaction was demonstrated to be associated with improved firm value.

No significant interaction between grant sensitivity and portfolio sensitivity was found, overall. However, for the subset of firms that exhibit CEO incentive disequilibrium, a positive association with firm value was noted.

Taken together, the findings in this study provide support for CEO incentive equilibrium as a factor that conditions the association between stock option grants and firm value. In addition, this study provides evidence in support of theoretical predictions regarding the interaction between a CEO's portfolio incentives and those embedded in an option grant.

The conclusions reached in this study, based on the model employed, assume efficient markets, and that disclosure of option grant information is effectively and accurately impounded in stock price. The impact of stock option compensation was measured in this study by the expectations of managerial actions formed by investors on the basis of stock option grant disclosures and embedded in price. Future research into the level of transparency in stock option disclosure and recognition will be important to increasing the knowledge of the valuation impact of stock option compensation.

CHAPTER VII

SENSITIVITY ANALYSIS

Sensitivity of Results to Alternative Model Specifications

The primary analyses presented in this paper have adopted a returns model for examining the relationship between stock option grant characteristics and firm value, and have applied ordinary least squares (OLS) analysis. The data consists of panel data, where multiple observations are present for a large number of firms over a long series of timeframes, in this case, fiscal years. In such a data set, there is potential for residuals to be correlated over time, over firm, or both. Correlation in residuals is a violation of OLS assumptions, the consequence of which is biased estimators and unreliable inferences based on these estimators. There are a number of approaches that have been used in accounting and finance literature to address panel data. This study applies some of these approaches as sensitivity analyses, to test whether the inferences presented in the primary results of this study are sensitive to these adjustments for potential correlation in residuals.[27]

[27] Petersen (2006) examines these methods and evaluates their applicability to specific dataset conditions..

Table 15

Fama Macbeth Regressions: Hypothesis 1 & 2

Dependent variable	H1 Price $_{(t)}$	H1 Return $_{(t-1,t)}$	H2 Price $_{(t)}$	H2 Return $_{(t-1,t)}$
Independent variables				
Intercept	25.670 (< .0001)	1.066 (< .0001)	25.385 (< .0001)	1.051 (< .0001)
BV / Sales	–0.167 (.6410)	–0.004 (.4358)	–0.134 (.6217)	0.008 (.3675)
NI / Sales	37.956 (<.0001)	0.329 (<.0001)	36.633 (< .0001)	0.299 (.0003)
Prior Grant Indicator (POGIND)	3.990 (<.0001)	–0.005 (< .6906)	1.093 (.0184)	–0.079 (.9999)
Disequilibrium Indicator (DEQIND)			0.924 (.0219)	0.036 (.0553)
POGIND * DEQIND			4.908 (< .0001)	0.132 (< .0001)
N – Total Sample Size	12,987	12,975	12,986	12,975
N(max) – Maximum annual sample size	1,718	1,727	1,718	1,727
N(min) – Minimum annual sample size	1,473	1,461	1,473	1,461
Average Adjusted R-squared	.093	.018	.106	.039

Notes

For each independent variable in this analysis, the top figure is the mean coefficient from 8 annual regressions between 1994 and 2001. The second number (in parentheses) is the p-value from a two-sided test that this mean coefficient is different from zero. The standard deviation used in this t-test is that of the 8 annual coefficients. Year indicator variables are suppressed.

Variable Definitions:

Return $_{(t-1, t)}$ = One-period raw return: Fiscal Year End (t) price per share / Fiscal Year End (t–1) price per share

Price $_{(t)}$ = Fiscal Year End (t) price per share

BV / Sales = Book Value at year-end (t) / Sales $ in year (t)

NI / Sales = Net Income per Sales $ in year (t)

POGIND: Indicator = 1 if firm grants CEO options in (t–1), else = 0

DEQIND: Indicator = 1 if firm is in incentive disequilibrium for year-end (t–2 to t+1), else = 0

Fama Macbeth regression was used to test Hypotheses 1 and 2 in the presence of potential correlated residuals. Fama MacBeth regression is applicable to datasets where there is low firm-specific persistence (Petersen 2006), and this is expected to be the case for a returns model where the independent variables are primarily dichotomous indicator variables. Table 15 presents the results of Fama MacBeth analysis of Hypotheses 1 and 2.[28] The results in Table 15 for the returns models are generally consistent with results presented in Table 7 with respect to sign and significance of coefficients. Table 8 and Table 15 differ in significance (but not sign) for the variable POGIND. No specific prediction was made for the sign on this variable, however, an expectation of non-significance was maintained, a priori. While this difference between Table 8 and Table 15 is notable, it is not part of the formal hypothesis. Therefore, the results presented in this study for Hypotheses 1 and 2 appear to be robust to Fama Macbeth correction for time-series correlation.

Kothari and Zimmerman (1995) suggest enriching studies by testing both price and returns models, This study tests Hypotheses 1 and 2 as price models analyzed using Fama Macbeth regressions. The results of this analysis are presented in Table 15 alongside the results of the Fama Macbeth regressions for the returns model. Interpretation of price models is slightly different from that for returns models. The price model measures the level of the dependent variable at the end of the return period, while the return model measures the change in the dependent variable over the return period. Since option grants may be considered a "flow," measuring their impact with a "stock"

[28] The Fama Macbeth procedure used in this study follows Bushee and Noe (2000).

measure is problematic. There are many potential omitted variables that comprise the "stock" measure which were generated in periods before the return is measured. In tests of Hypothesis 1, while returns are not noted to be associated with prior option grants, price is significantly and positively associated with an option grant in the immediately prior period (coefficient = 1.093, p-value = .0184) The coefficient estimates are many orders of magnitude larger in the price level model versus those in the returns model.

Price-level tests of Hypotheses 3 through 5 are executed by computing Rogers standard errors. Rogers standard errors are a method of correcting for correlated errors, using year-specific indicator variables and clustering on firm, as suggested by Petersen (2006). The results of these analyses are presented in Table 16. The variables of interest are common in their sign and significance between Table 12, the base (returns) model, and Table 16, the price level model.

Table 16

Price Level Regressions: Hypotheses 3, 4, & 5

Dependent variable		**H 3** **Price $_{(t)}$**		**H 4&5** **Price $_{(t)}$**
Independent variables	Predicted Sign	Rogers SE	Predicted Sign	Rogers SE
Intercept		25.541 (< .0001)		26.258 (< .0001)
BV / Sales		3.687 (<.0001)		3.615 (<.0001)
NI / Sales		30.658 (<.0001)		33.424 (< .0001)
POGSTER		–9.411 (< .0001)		–9.664 (<.0001)
POPSTER:		5.354 (<.0001)		4.481 (.0005)
URW: Uncorrelated Wealth		–4.399 (<.0001)		–5.304 (.0008)
DEQIND * POGSTER	+	13.881 <.0001)		
POGSTER * POPSTER			-	–0.119 (.9282)
POGSTER * URW			+	3.248 (.0108)
Number of observations		6090		6090
Number of clusters		1623		1623
Adjusted R-squared		.1614		.1601

Notes

For each variable in the model, the top figure is the regression coefficient, while the second number (in parentheses) is the p-value from a two-sided test that this coefficient is different from zero. Year indicator variables are suppressed.

Variable Definitions:

Price $_{(t)}$ = Fiscal Year End (t) price per share

BV / Sales = Book Value at year-end (t) / Sales $ in year (t)

NI / Sales = Net Income per Sales $ in year (t)

DEQIND: Indicator = 1 if firm is in incentive disequilibrium for year-end (t–2 to t+1), else = 0

URW: Uncorrelated Wealth = CEO Salary in year (t–1) scaled by sales in year (t)

POGSTER: Sensitivity to Equity Risk of CEO Options granted in year (t–1) scaled by sales in year (t)

POPSTER = Sensitivity to Equity Risk of CEO Portfolio at year-end (t–1) scaled by sales in year (t)

Sensitivity of Results to Analysis Based on Size-Adjusted Returns

The basic analysis in this research employed raw returns as a dependent variable. Additional analysis was performed to examine the sensitivity of results to size-adjusted returns. The sensitivity of its result to size-adjusted returns, based on the CRSP universe decile returns was examined. Table 17 presents the results of tests of Hypotheses 1 and 2 when returns are size-adjusted. Table 18 presents the results of tests of Hypotheses 3 through 5 when returns are measured as size-adjusted. These results are qualitatively the same as those in the primary analysis, thus the study's results are not sensitive to using size-adjusted returns instead of raw returns.

Sensitivity of Results to Influential Variables

The main results of this study were computed using data where outlying variable observations were deleted at the 1% and 99% levels. The distribution of firm and option sensitivity data is highly skewed, however, as can be noted in Table 6. The 1% and 99% levels did not capture all of the influential variables as measured by DFFITS and studentized residuals. As an additional sensitivity analysis, the research hypotheses were tested with a dataset that, in addition to the 1% and 99% cutoffs, excluded influential observations as defined by DFFITS and studentized residuals in excess of 2. The results of these analyses (untabulated) show that the inferences from the primary results of the study are essentially unchanged by the exclusion of the additional influential variables. This provides evidence that the results are not driven by influential variables.

Table 17

Size-adjusted Return Regressions: Hypotheses 1 & 2

Dependent variable		**H 1** **Adj. Return $_{(t)}$**		**H 2** **Adj. Return $_{(t)}$**
Independent variables	Predicted Sign		Predicted Sign	
Intercept		–0.057 (< .0001)		–0.038 (< .0015)
BV / Sales		–0.010 (.1640)		–0.005 (.5407)
NI / Sales		0.386 (<.0001)		0.353 (<.0001)
POGIND	+	–0.011 (.2088)		–0.085 (<.0001)
DEQIND				0.032 (.0248)
POGINT = POGIND * DEQIND			+	0.148 (<.0001)
F-test: $\beta_{(POGIND)} + \beta_{(POGINT)} = 0$			+	.063 (<.0001)
Number of observations		12,260		12,260
p-value		<.0001		<.0001
Adjusted R-squared		.0792		.0792

Notes

For each variable in the model, the top figure is the regression coefficient, while the second number (in parentheses) is the p-value from a two-sided test that this coefficient is different from zero. Year indicator variables are suppressed.

Variable Definitions:

Price $_{(t)}$ = Fiscal Year End (t) price per share

BV / Sales = Book Value at year-end (t) / Sales $ in year (t)

NI / Sales = Net Income per Sales $ in year (t)

DEQIND: Indicator = 1 if firm is in incentive disequilibrium for year-end (t–1 to t+1), else = 0

POGIND: Indicator = 1 if firm grants CEO options in (t–1), else = 0

Table 18

Size-adjusted Return Regressions: Hypotheses 3, 4, & 5

Dependent variable		**H 3 Adj. Return $_{(t)}$**		**H 4&5 Adj. Return $_{(t)}$**
Independent variables	Predicted Sign		Predicted Sign	
Intercept		0.916 (< .0001)		0.920 (< .0001)
BV / Sales		0.006 (.6963)		0.006 (.6894)
NI / Sales		0.314 (<.0001)		0.361 (< .0001)
POGSTER		–0.118 (.0010)		–0.004 (.9186)
POPSTER:		–.090 (<.0001)		–0.124 (.0005)
URW: Uncorrelated Wealth		0.033 (<.0001)		0.028 (.0009)
DEQIND * POGSTER	+	0.524 <.0001)		
POGSTER * POPSTER			–	0.002 (.9252)
POGSTER * URW			+	0.037 (.0021)
Number of observations		5278		5278
p-value		<.0001		<.0001
Adjusted R-squared		.0948		.0737

Notes

For each variable in the model, the top figure is the regression coefficient, while the second number (in parentheses) is the p-value from a two-sided test that this coefficient is different from zero. Year indicator variables are suppressed.

Variable Definitions:

Price $_{(t)}$ = Fiscal Year End (t) price per share

BV / Sales = Book Value at year-end (t) / Sales $ in year (t)

NI / Sales = Net Income per Sales $ in year (t)

DEQIND: Indicator = 1 if firm is in incentive disequilibrium for year-end (t–2 to t+1), else = 0

URW: Uncorrelated Wealth = CEO Salary in year (t–1) scaled by sales in year (t)

POGSTER: Sensitivity to Equity Risk of CEO Options granted in year (t–1) scaled by sales in year (t)

POPSTER = Sensitivity to Equity Risk of CEO Portfolio at year-end (t–1) scaled by sales in year (t)

Sensitivity of Results to Alternate Measure of Equilibrium

The primary results are based on measuring equilibrium in CEO incentives based on sensitivity of the CEOs portfolio to equity risk. This is consistent with the definition of portfolio optimality defined by Core and Guay (1999). Since the focus of this study, however, are the CEO's incentives for risk-taking, it seems reasonable to examine the impact on the results of the study if equilibrium is measured in terms of sensitivity to equity risk. Additional analysis of this data (untabulated) using sensitivity to equity risk to define equilibrium status shows that the results are qualitatively the same when the alternate measure of equilibrium is used. Thus the results of the study are not dependent on whether equilibrium in CEO incentives is defined in terms of sensitivity to equity risk or sensitivity to stock price.

CHAPTER VIII

CONCLUSIONS

This study found no universal positive association between option grants and firm value. It did find, however, that conditions surrounding the relationship between grants, grant sensitivity, and CEO incentive equilibrium influence the association between the grants and firm value. The positive association between grants and firm value was not evidenced in the sub-sample of data for firms in CEO incentive equilibrium. This indicates that the valuation impact of stock option grants is highest for firms that do not demonstrate incentive equilibrium, but rather demonstrate a trend of increasing CEO portfolio sensitivity to stock price.

High CEO portfolio sensitivity is not found to interact with grant sensitivity in a manner that reduces firm value. Thus, this study did not find support for the hypothesis that grants further reduce CEO diversification, and interact with portfolio sensitivity to reduce incentives for risk-taking. However, consistent with LLV, high levels of unrelated wealth are found to interact with grant sensitivity so as to increase the positive impact of grant sensitivity on firm value.

Future contributions in this area should include consideration of additional, firm-specific factors that may mitigate or enhance the incentive impact of option grants. These firm-specific factors may have an impact through their association with CEO incentive equilibrium. One firm-specific factor that may be of high importance is firm strategy, since the impact of option grants in a “build” strategy firm is likely dif-

ferent from that of option grants in a “harvest” or “hold” strategy firm. The nature of the grants awarded as well as the optimal level of risk-taking incentives likely differs between these types of firms.

Study of the incentives embodied in option grants presumes that executives receiving these grants understand their implications fully, or at a minimum, have a heuristic method available to assess the value of the option with respect to stock return volatility. There is some question regarding the validity of this assumption. Hall (1998) suggested that the changes in option value that accompany changes in firm value are understood poorly by CEOs, as well as boards of directors and academics. This jeopardizes the strength of claims about the effectiveness of stock option incentives. The sample in this study is restricted to CEOs, thus presuming a high level of financial sophistication and mitigating the risk of incentive failure due to incomprehension. However, the limitation posed by this risk is inherent in this study. It points to the importance of future research that investigates the level of understanding on the part of CEOs and compensation committees of the complexities of stock option compensation.

LLV (1991) highlighted the importance of executive risk-aversion on the incentive value of a compensation contract. This study is limited in that it assumes a restricted range of risk preferences among CEOs, and excludes this variable from the analysis, since measurement of this variable is beyond the scope of this research project.

The majority of option grants are awarded with a strike price equal to the market price of the stock on the day of the grant. A small proportion of grants is issued at a

premium, with the strike price of the option exceeding the market price of the stock. Future research on the incentives generated by these options, labeled "performance options," as differentiated from in-the-money options that comprise the majority of grants, will provide valuable additional insight into the effectiveness of option grants. Gerakos et al. (2005) are pursuing preliminary work in this area. This research requires further investigation of the functional form of the relationship between existing measures of option incentives and output measures. The line of research is closely linked to a second important area for future research, incentive remedies for options on stocks that lose significant value.

The existence of non-contractual repricing actions associated with options that become "underwater" is not addressed by the incentive analysis in this paper. Repricing is aimed at retention incentives; the option incentives investigated in this paper are targeted at risk-taking. In theory, any ex-post repricing that occurs is not part of an ex-ante contract. As such, it may have little incentive impact. Alternatively, if a CEO is aware of a non-zero probability of repricing, this awareness likely has an incentive impact, possibly as a moderating influence on risk-aversion. The incentive impact of non-contractual repricing and other remedies for options that become worthless over time is unclear.[29] It is an interesting direction for future research.

Consistent with related studies, e.g., Hanlon et al. (2003), the findings of this study depend on model specification. Fundamental research that further develops em-

[29] In lieu of repricing, some companies make additional grants at the lower stock price, replace options with restricted stock, cancel options and replace them at least six months later, buy out options with cash, and/or allow employees to sell options to a third party at a negotiated price.

pirical models of the relationship between compensation and its effects on the firm will add significantly to future studies in this area.

Barth and Clinch (2001) show that industry controls influence the predictive power of the Ohlson valuation model using a 15-industry classification scheme. Analysis of the results of this study (untabulated) controlling for these 15 industries does not change the inferences taken from the base returns model. However, it seems reasonable to expect that there would be some industries for which the noted determinants of option effectiveness would be relatively more influential. Further investigation of industry differences in option grant effectiveness is a promising direction for future research.

The impact of backdating on grant sensitivity and the evolution of CEO portfolio incentives over time will be an important area for future research. Recent publicity surrounding the backdating and springloading of option grants has renewed questions about compensation committee effectiveness. Heron and Lie (2006) document a substantial reduction in abnormal patterns of stock returns surrounding option grants following the implementation of a 2002 SEC requirement that option grants be disclosed within two business days. Previously, a 45-day disclosure period was in effect. The reduced reporting period allows less opportunity for backdating and therefore has implications for option grant sensitivity. An extension of this dissertation is in progress that extends the timeframe of the sample to incorporate data following implementation of the 2002 SEC accelerated disclosure requirement. This will enable investigation of the changes in grant sensitivity and the relationship between grant sensitivity and firm value that took place as a result of the change in the disclosure requirement. Other

studies that evaluate the impact of this change on CEO incentives will contribute additional understanding of the value of stock option compensation.

While stock option compensation to CEOs has abated somewhat, stock option compensation to directors is increasing. Byard and Li (2005) found that between 1992 and 1996, stock option compensation represented an average of 16% of director's pay. Between 1996 and 2002, option grants averaged 46% of directors' pay. Instead of aligning directors' interests with that of shareholders, Byard and Li suggest that the options may align directors' pay with that of managers against the shareholders. Further research to define these relationships and identify conflicts will contribute significantly to governance research.

REFERENCES

Aboody, D. 1996. Market Valuation of Employee Stock Options. *Journal of Accounting and Economics* 22 (1-3):357-391.

Aboody, D., M. Barth, and R. Kasznik. 2004. SFAS No. 123 Stock-based Compensation Expense and Equity Market Values *The Accounting Review* 79 (2):251-275.

Aboody, D., and R. Kasznik. 2000. CEO Stock Option Awards and the Timing of Corporate Voluntary Disclosures. *Journal of Accounting and Economics* 29 (1):73-100.

Agrawal, A., and G. Mandeleker. 1987. Managerial Incentives and Corporate Investment and Financing Decisions. *The Journal of Finance* 42 (4):823-837.

Amir, E. 1993. The Market Valuation of Accounting Information: The Case of Postretirement Benefits Other Than Pensions. *The Accounting Review* 68 (4):703-724.

Antle, R., and A. Smith. 1985. Measuring Executive Compensation: Methods and an Application. *Journal of Accounting Research* 23 (1):296-325.

Baber, W., S. Janakiraman, and S. Kang. 1996. Investment Opportunities and the Structure of Executive Compensation. *Journal of Accounting and Economics* 21 (3):297-318.

Baiman, S. 1982. Agency Research in Managerial Accounting: A Survey. *Journal of Accounting Literature* 1:154-213.

———. 1990. Agency Research in Managerial Accounting: A Second Look. *Accounting Organizations and Society* 15 (4):341-371.

Baker, G. 1993. Growth, Corporate Policies, and the Investment Opportunity Set. *Journal of Accounting and Economics* 16 (1-3):161-165.

Baker, G., and B. Hall. 1998. CEO Incentives and Firm Size. Report, Boston, MA: Harvard Business School.

Barth, M., and G. Clinch. 2001. Scale Effects in Capital Markets-Based Accounting Research. Report, London, England: London Business School.

Bizjak, J., J. Brickley, and J. Coles. 1993. Stock-based Incentive Compensation and Investment Behavior. *Journal of Accounting and Economics* 16 (1-3):349-372.

Black, F., and M. Scholes. 1973. The Pricing of Options and Corporate Liabilities. *The Journal of Political Economy* 83 (3):637-654.

Bushee, B., and C. Noe. 2000. Disclosure Practices and Stock Return Volatility. *Journal of Accounting Research* 38 (Supplement):171-202.

Byard, D., and Y. Li. 2005. The Impact of Directors' Option Compensation on Their Independence. Report, New York, NY: City University of New York.

Carpenter, J. 2002. Does Option Compensation Increase Managerial Risk Appetite? *The Journal of Finance* 55 (5):2311-2331.

Core, J., and W. Guay. 1999. The Use of Equity Grants to Manage Optimal Equity Incentive Levels. *Journal of Accounting and Economics* 28 (2):151-184.

———. 2002. Estimating the Value of Employee Stock Option Portfolios and Their Sensitivities to Price and Volatility. *Journal of Accounting Research* 40 (3):613-630.

DeChow, P., and R. Sloan. 1991. Executive Incentives and the Horizon Problem. *Journal of Accounting and Economics* 14 (1):51-89.

DeFusco, R., R. Johnson, and T. Zorn. 1990. The Effect of Executive Stock Option Plans on Stockholders and Bondholders. *The Journal of Finance* 45 (2):617-627.

Demsetz, H., and K. Lehn. 1985. The Structure of Corporate Ownership: Causes and Consequences. *The Journal of Political Economy* 93 (6):1155-1177.

Feltham, G., and M. Wu. 2001. Incentive Efficiency of Stock Versus Options. *Review of Accounting Studies* 6:7-28.

Foster, T., P. Koogler, and D. Vickery. 1991. Valuation of Executive Stock Options and the FASB Proposal. *The Accounting Review* 66 (3):595-610.

Garvey, G. T., and A. Mawani. 2005. Risk-taking Incentives of Executive Stock Options and the Asset Substitution Problem. *Accounting and Finance* 45 (1):3-23.

Gaver, J., and K. Gaver. 1993a. Additional Evidence on the Association Between the Investment Opportunity Set and Corporate Financing, Dividend, and Compensation Policies. *Journal of Accounting and Economics* 16 (1-3):125-160.

———. 1993b. The Association Between Performance Plan Adoption and Corporate Capital Investment: A Note. *Journal of Management Accounting* 5:145-158.

Gerakos, J., T. Goodman, C. Ittner, and D. Larcker. 2005. The Adoption and Characteristics of Performance Stock Option Grants. Report, Philadelphia, PA: The Wharton School, University of Pennsylvania.

Guay, W. 1999. The Sensitivity of CEO Wealth to Equity Risk: An Analysis of the Magnitude and Determinants. *Journal of Financial Economics* 53:43-71.

Hall, B. 1998. The Pay-to-Performance Incentives of Executive Stock Options. Report, Cambridge, England: National Bureau of Economic Research.

Hall, B., and J. Liebman. 1998. Are CEOs Really Paid Like Bureaucrats? *The Quarterly Journal of Economics* 153 (3):653-691.

Hall, B., and K. Murphy. 2003. The Trouble with Stock Options Report, Boston, MA: Harvard Negotiations, Organizations and Market Unit

Hanlon, M., S. Rajgopal, and T. Shevlin. 2003. Are Executive Stock Options Associated with Future Earnings? *Journal of Accounting and Economics* 36 (1-3):3-42.

Haubrick, J. 1994. Risk Aversion, Performance Pay, and the Principal-Agent Problem. *The Journal of Political Economy* 102 (2):258-276.

Healy, P. 1985. The Effect of Bonus Schemes on Accounting Decisions. *Journal of Accounting and Economics* 7 (1-3):85-107.

Hemmer, T. 1993. Risk-free Incentive Contracts. *Journal of Accounting and Economics* 16 (4):447-473.

Hemmer, T., S. Matsunaga, and T. Shevlin. 1994. Estimating the "Fair Value" of Employee Stock Options with Expected Early Exercise. *Accounting Horizons* 8:23-42.

Heron, R., and E. Lie. 2006. Does Backdating Explain the Stock Price Pattern Around Executive Stock Option Grants? *Journal of Financial Economics* (Forthcoming: available at SSRN: http://ssrn.com/abstract=877889).

Holmstrom, B. 1979. Moral Hazard and Observability. *Bell Journal of Economics* 10:74-91.

Holmstrom, B., J. Ricart, and I. Costa. 1986. Managerial Incentives and Capital Management. *Quarterly Journal of Economics* 101:835-860.

Huddart, S. 1994. Employee Stock Options. *Journal of Accounting and Economics* 18 (2):207-231.

Hull, J. 2000. *Options, Futures and Other Derivatives*. 4th ed. Upper Saddle River, NJ: Prentice-Hall.

Janakiraman, S. 1998. Stock Option Awards and Option Exercise Behavior of CEOs: An Empirical Analysis. Report, Dallas, TX: University of Texas at Dallas.

Jensen, M., and K. Murphy. 1990. Performance Pay and Top Management Incentives. *Journal of Political Economy* 98:225-264.

Kole, S. 1997. The Complexity of Compensation Contracts. *Journal of Financial Economics* 43:79-104.

Kothari, S. 2001. Capital Markets Research in Accounting. *Journal of Accounting and Economics* 31:105-231.

Kothari, S., and J. Zimmerman. 1995. Price and Return Models. *Journal of Accounting and Economics* 20 (2):155-192.

Lambert, R. 1986. Executive Effort and the Selection of Risky Projects. *Rand Journal of Economics* 17 (1):77-88.

Lambert, R., W. Lanen, and D. Larcker. 1987. Executive Stock Option Plans and Corporate Dividend Policy. *Journal of Financial and Quantitative Analysis* 24:409-425.

Lambert, R., and D. Larcker. 1987. An Analysis of the Use of Accounting and Market Measures of Performance in Executive Compensation Contracts. *Journal of Accounting Research* 25 (Supplement).

———, ———. 2004. Stock Options, Restricted Stock, and Incentives: Social Sciences Research Network. Available at: http://ssrn.com/abstract=527822.

Lambert, R., D. Larcker, and R. Verrechia. 1991. Portfolio Considerations in Valuing Executive Compensation. *Journal of Accounting Research* 29 (Spring):129-149.

Lewellen, W., C. Loderer, and K. Martin. 1987. Executive Compensation and Executive Incentive Problems. *Journal of Accounting and Economics* 9 (3):287-310.

Loderer, C., and K. Martin. 1997. Executive Stock Ownership and Performance: Tracking Faint Traces *Journal of Financial Economics* 45:223-255.

Matsunaga, S. 1995. The Effects of Financial Reporting Costs on the Use of Employee Stock Options. *The Accounting Review* 70 (1):1-26.

Mehran, H. 1995. Executive Compensation Structure, Ownership, and Firm Performance. *Journal of Financial Economics* 38:163-184.

Milgrom, P., and J. Roberts. 1992. *Economics, Organization and Management* Englewood Cliffs, NJ Prentice-Hall, Inc.

Muelbroek, L. 2001. The Efficiency of Equity-Linked Compensation: Understanding the Full Cost of Awarding Executive Stock Options. *Financial Management* 30 (2):5-30.

Murphy, K. 1999. Executive Compensation. In *Handbook of Labor Economics*. Amsterdam, The Netherlands: North-Holland.

Myers, S. 1977. Determinants of Corporate Borrowing. *Journal of Financial Economics* 5:147-175.

Noreen, E., and M. Wolfson. 1981. Equilibrium Warrant Pricing Models and Accounting for Stock Options. *Journal of Accounting Research* 19 (2):384-398.

Ofek, E., and D. Yermack. 2000. Taking Stock: Equity-Based Compensation and the Evolution of Managerial Ownership *Journal of Finance* 55:1367-1384.

Ohlson, J. A. 1991. Earnings, Book Values and Dividends in Equity Valuation. *Contemporary Accounting Research* 11 (2):661-687.

Petersen, M. 2006. Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. Report, Evanston, IL: Northwestern University Kellogg School of Management; National Bureau of Economic Research (NBER).

Rajgopal, S., and T. Shevlin. 2002. Empirical Evidence on the Relation Between Stock Option Compensation and Risk-Taking. *Journal of Accounting and Economics* 33 (2):145-171.

Rees, L., and D. Stott. 1998. The Value-Relevance of Stock-Based Employee Compensation Disclosures Working paper, College Station, TX: Texas A&M University.

Rosen, S. 1992. Contracts and the Market for Executives. In *Contract Economics* edited by L. Wernin and H. Wijkander. Oxford, England: Basil Blackwell, 181-211.

Ross, S. 2004. Compensation, Incentives, and the Duality of Risk Aversion and Riskiness. *Journal of Finance* 59 (1):207-225.

Shiller, R. 2003. From Efficient Markets Theory to Behavioral Finance. *Journal of Economic Perspectives* 17 (1):83-104.

Smith, C., and R. Stultz. 1985. The Determinants of Firms' Hedging Policies. *Journal of Financial and Quantitative Analysis* 20 (4):391-405.

Smith, C., and R. Watts. 1992. The Investment Opportunity Set and Corporate Financing, Dividend, and Compensation Policies. *Journal of Financial Economics* 32:263-292.

Tehranian, H., and J. Wagelin. 1985. Market Reaction to Short-Term Executive Compensation Plan Adoption. *Journal of Accounting and Economics* 7 (1-3):131-144.

Tufano, P. 1996. Who Manages Risk? An Empirical Examination of Risk Management Practices in the Gold Mining Industry. *The Journal of Finance* 51 (4):1097-1137.

Yermack, D. 1995. Do Corporations Award CEO Options Effectively? *Journal of Financial Economics* 39:237-269.

———. 1997. Good Timing: CEO Stock Option Awards and Company News Announcements. *The Journal of Finance* 52 (2):449-476.

APPENDIX A

VARIABLE DEFINITIONS

Variable	Description
Return (t–1, t)	Price per share at (t) / Price per share at (t–1)
D95 – D01	Indicator variables to create separate intercepts for 1994 – 2001 observations
BV/Sales(t)	Book Value(t) scaled by sales in year t
NI/Sales(t)	Net Income(t) scaled by sales in year t
POGSTER(t)	Prior year (t–1) option grant sensitivity to equity risk
POGIND(t)	Indicator variable = 1 if options were granted in prior year (t–1), else = 0
DEQIND(t)	Indicator variable = 1 if firm demonstrates incentive disequilibrium, Else=0
POPSTER(t)	Prior year option portfolio sensitivity to equity risk
Uncorrelated Wealth(t) (URW)	Prior year CEO salary scaled by sales

APPENDIX B

BLACK-SCHOLES OPTION PRICING MODEL

The Black-Scholes formula for valuing European call options, as modified to account for dividend pay-outs (Merton, 1973) is presented below.

Option Value = $[S\, e^{-dT}\, N(Z) - X\, e^{-rT}\, N(Z - \sigma T^{(1/2)})]$

Where:

$Z = [\, \ln(S / X) + T\, (r - d + \sigma^2 / 2)] / \sigma T^{(1/2)}$

N = cumulative probability function for the normal distribution

S = price of underlying stock

X = exercise price of the option

σ = expected stock return volatility over the life of the option

r = log of risk-free interest rate

T = time to maturity of the option in years

d = log of expected dividend yield over the life of the option

APPENDIX C

COMPUTATION OF VARIABLES

B.1. Estimating the sensitivity of an option grant to stock-return volatility. (Core and Guay, 2002)

1. Gather data on CEO option grants from most recent proxy statement, or Execucomp:
   (i) number of options, (ii) exercise price, (iii) time to maturity
2. Gather other parameters from CRSP, Compustat, or other source.

[∂(option value)/∂(stock volatility) * (0.01) = e^{-dT} N'(Z) S $T^{(1/2)}$ * (0.01)

Where parameters are as defined in the Black-Scholes model (APPENDIX B).

B.2. Estimating the sensitivity of an option grant to stock price (Core and Guay, 2002)

1. Gather data on CEO option grants from most recent proxy statement or Execucomp:
   (i) number of options, (ii) exercise price, (iii) time to maturity
2. Gather other parameters from CRSP, Compustat, or other source.

[∂(option value)/∂(price) * (price/100) = e^{-dT} N(Z) * (price / 100)

Where parameters are as defined in the Black-Scholes model (APPENDIX B).

B.3. Estimating the sensitivity of an option portfolio to stock-return volatility (Core & Guay, 2002)

1. Gather data on CEO option portfolio from most recent proxy statements or Execucomp:
   (i) number of exercisable and unexercisable options outstanding
   (ii) current realizable value of exercisable and unexercisable options
2. Compute exercise prices as follows:
   a. compute average exercise price for exercisable options as S – (current realizable value of exercisable options/ # exercisable options)
   b. compute average exercise price for unexercisable options as S – (current realizable value of unexercisable options/ # unexercisable options)

3. Compute time-to-maturity as follows:
   a. of unexercisable options equal to one year less than time-to-maturity of current year's grant (or nine years if no new grant was made)
   b. of exercisable options equal to three years less than time-to-maturity of unexercisable options (or six years if no new grant was made)
4. Compute fiscal year end sensitivity of CEO option portfolio to stock-return volatility as in (B.1), using aggregate sensitivities of exercisable and unexercisable options as computed in (B.3, steps 2 and 3).

B.4. Estimating the sensitivity of an option portfolio to stock price (Core & Guay, 2002).

1. Gather data on CEO option portfolio from most recent proxy statements or Execucomp:
   (i) number of exercisable and unexercisable options outstanding
   (ii) current realizable value of exercisable and unexercisable options
2. Compute exercise prices as follows:
   a. compute average exercise price for exercisable options as S – (current realizable value of exercisable options/ # exercisable options)
   b. compute average exercise price for unexercisable options as S – (current realizable value of unexercisable options/ # unexercisable options)
3. Compute time-to-maturity as follows:
   a. of unexercisable options equal to one year less than time-to-maturity of current year's grant (or nine years if no new grant was made)
   b. of exercisable options equal to three years less than time-to-maturity of unexercisable options (or six years if no new grant was made)
4. Compute fiscal year end sensitivity of CEO option portfolio to stock price as in using aggregate sensitivities of exercisable and unexercisable options as computed in (B.4, steps 2 and 3).

VITA

CATHERINE KRUEGER WEBER

Department of Accounting
4353 TAMU
College Station, Texas 77843-4353

Phone (979) 845-0961
email: ckweber@ev1.net

EDUCATION

Mays Business School, Texas A&M University College Station, TX
- 2006: Doctor of Philosophy, Accounting
  Dissertation: "The Impact of CEO Option Grants on Firm Value: Determinants of the Effectiveness of Option Grants"

Fuqua School of Business, Duke University Durham, NC
- 1982: Master of Business Administration, Concentration: Finance

Westhampton College, University of Richmond Richmond, VA
- 1980: Bachelor of Arts, Mathematics

PUBLICATIONS

- "Celebrating Accounting Heroes: An Alternative Approach to Teaching Ethics" (1998)
  Advances in Accounting Education, Volume 1
  Co-authored with M.C. Knapp and T.J. Louwers.
- "Using the AICPA Electronic Research Series Professional Standards as an Instructional Resource in Auditing" (1997)
  The Auditors' Report (21)
  Co-authored with T. Louwers and E. Typpo

PROFESSIONAL EXPERIENCE

2004—2006 University of Houston Houston, TX.

Lecturer
- ACCT 7340, Financial Statement Analysis
- ACCT 6331, Financial Accounting, MBA.

1998—1999 Texas A&M University College Station, Texas

Research Assistant
Instructor
- ACCT 209, Introduction to Accounting for Non-Accounting Majors

1991—1993 Resolution Trust Corporation Houston, TX

Accounting Manager
Financial Budget Specialist